Epidemiology, Carcinogenesis and Prevention of Cancer

OCN Review
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Objectives

- Identify the three leading causes of cancer deaths worldwide.
- Describe the difference between primary, secondary and tertiary prevention strategies.
- Identify five lifestyle risk factors for the development of cancer.
- Develop a basic understanding of carcinogenesis.
- Describe the role of the oncology nurse in cancer prevention.
Cancer Epidemiology

Definition:

The study of the factors determining and influencing the frequency and distribution of cancer in population groups.
Cancer Epidemiology

- Epidemiology terminology
  - Rate: mathematical measure of the frequency of the disease or healthcare problem in a specified period of time
  - Incidence: number of newly diagnosed cases in a specific population during a defined period of time
  - Prevalence: number or percent of people alive on a certain date in a population who previously had a diagnosis of cancer [includes new incidence and pre-existing cases]
    - Information is used for health planning, resource allocation, estimation of cancer survivorship
Cancer Epidemiology

• Epidemiology terminology

• Mortality rates: rate of death reported as an adjusted rate that considers population characteristics such as age and as a crude rate without any contextual adjustments

• Morbidity rate: reports rates of illness, disease, infection, disability, etc.

• Fatality: number of persons among all those who have a form of cancer who die during a specified period of time
Cancer Statistics

• Epidemiology Terminology

  • Fatality: number of persons among all those who have a form of cancer who die during a specified period of time
  • Provides a measure of aggressiveness of cancer or the success of medical intervention
Global Cancer Statistics

- Cancer is the leading cause of death worldwide accounting for 8.2 million deaths [around 13% of all deaths]
- The total number of cases globally is increasing
- The three leading cancer killers worldwide are lung (17.8% of all cancer deaths), stomach (10.4%), and liver (8.8%)
- According to the WHO
  - Cancer rates will increase by 50% to 15 million new cases in 2020 due to steadily aging population, increases in smoking and worldwide adoption of unhealthy lifestyles
  - Annual death toll from tobacco alone will climb to 10 million people in 2020, double what it is now
Cancer Rates Relative to Select Demographic Variables

Age
• Incidence of most cancers increases with age

Gender
• Cancer is more common in males than females

Geography
• Major incidence and mortality differences exist in different locations

Socioeconomic status
• Lower SES associated with increased risk of lung, cervical, stomach, head & neck cancers
• Higher SES associated with breast, prostate and colon cancer
• Economic, social and cultural factors can create barriers to accessing information and preventative services
### Estimated New Cancer Cases* in the US in 2018

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Males</th>
<th>Females</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Prostate</td>
<td>19%</td>
<td></td>
<td>30%</td>
</tr>
<tr>
<td>Lung &amp; bronchus</td>
<td>14%</td>
<td></td>
<td>13%</td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>9%</td>
<td></td>
<td>7%</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>7%</td>
<td></td>
<td>7%</td>
</tr>
<tr>
<td>Melanoma of skin</td>
<td>6%</td>
<td></td>
<td>5%</td>
</tr>
<tr>
<td>Kidney &amp; renal pelvis</td>
<td>5%</td>
<td></td>
<td>4%</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>5%</td>
<td></td>
<td>4%</td>
</tr>
<tr>
<td>Oral cavity &amp; pharynx</td>
<td>4%</td>
<td></td>
<td>4%</td>
</tr>
<tr>
<td>Leukemia</td>
<td>4%</td>
<td></td>
<td>3%</td>
</tr>
<tr>
<td>Liver &amp; intrahepatic bile duct</td>
<td>4%</td>
<td></td>
<td>3%</td>
</tr>
<tr>
<td>All other sites</td>
<td>22%</td>
<td></td>
<td>21%</td>
</tr>
</tbody>
</table>

*Breast is the most common cancer in females, followed by lung & bronchus. In males, prostate cancer is the most common, followed by lung & bronchus.
### Estimated Cancer Deaths in the US in 2018

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung &amp; bronchus</td>
<td>323,630</td>
<td>286,010</td>
</tr>
<tr>
<td>Prostate</td>
<td>26%</td>
<td>25%</td>
</tr>
<tr>
<td>Colon &amp; rectum</td>
<td>9%</td>
<td>14%</td>
</tr>
<tr>
<td>Pancreas</td>
<td>8%</td>
<td>8%</td>
</tr>
<tr>
<td>Liver &amp; intrahepatic bile duct</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>Leukemia</td>
<td>6%</td>
<td>5%</td>
</tr>
<tr>
<td>Esophagus</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>Non-Hodgkin lymphoma</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Kidney &amp; renal pelvis</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>All other sites</td>
<td>24%</td>
<td>24%</td>
</tr>
</tbody>
</table>

- For Males: Lung & bronchus (26%) is the leading cause, followed by prostate (9%), colon & rectum (8%), and pancreas (7%).
- For Females: Lung & bronchus (25%) is the leading cause, followed by breast (14%), colon & rectum (8%), and pancreas (7%).
Cancer Statistics

Cancer Rates By Race/Ethnicity

- African American men have a 14% higher incidence rate and a 33% higher death rates than white men
- African American women have a 6% lower incidence rate but a 16% higher death rate than white women
- Incidence and death rates for cancers related to infectious agents [cervix, stomach, liver] are generally higher in minority populations than whites
Cancer Statistics

Cancer Rates By Race/Ethnicity

- Minority populations are more likely than whites to be diagnosed at advanced stage disease for all 4 major cancer sites
- African Americans are less likely to survive cancer than whites
- Disparities related to inequalities in access to and receipt of quality healthcare as well as co-morbidities
Cancer Rates By Race/Ethnicity

- Less likely to be diagnosed at localized stages when treatment is less extensive and more successful
- All minority males had a greater probability than whites of dying from cancer within 5 years of diagnosis although the difference was smaller for Hispanic men.
- Among women, Asian Americans/Pacific Islanders (69%) and Hispanics (67%) have a higher 5-year survival followed by whites (66%), American Indians/Alaskan Native (60%) and African Americans (58%).
Cancer Statistics

Factors contributing to racial disparities in mortality by cancer site:

• Twice as high in Asian Americans/Pacific Islanders due to chronic infections with Helicobacter pylori and Hepatitis B virus

• Kidney cancer incidence and death rates are highest among American Indians/Alaskan Natives which may reflect higher prevalence of obesity and smoking
Cancer Statistics

Factors contributing to racial disparities in mortality by cancer site include differences in:

- Exposure to underlying risk factors, i.e. smoking
- Access to high-quality screening (for breast, cervical and colorectal cancers)
- Timely diagnosis and treatment
Cancer Statistics
Lung

Female

- 2nd most common cancer
- Accounts for 13% all female cancers; rates declining
- 112,350 new cases expected in US in 2018
- Rates [per 100,00 population] vary by ethnicity
  - Caucasian 50.2
  - African American 47.9
  - American Indian and Alaska native 31.2
  - Asian African and Pacific Islander 28
  - Hispanic 23.2
Cancer Statistics Lung

Male

- 2nd most common cancer
- Accounts for 14% all male cancers; rates declining
- 121,680 new cases expected in US in 2018
- Incidence rates [per 100,000 population] vary by ethnicity
  - African American 81.2
  - Caucasian 63.9
  - American Indian and Alaska native 45.4
  - Asian African and Pacific Islander 45.9
  - Hispanic 34.1
Cancer Statistics Breast

Female

• Most common cancer amongst women
• Accounts for 32% all female cancers and 15% all female cancer deaths
• Risk of lifetime development: 1 in 8
• Estimated 266,120 new cases and 40,920 deaths expected in US in 2018
• Highest mortality occurs among African American woman followed by Caucasians and Hawaiian women.
• 5-year survival rates for Caucasians (92%) exceeds African Americans (80%)
Cancer Statistics Breast

Male

- Rare disease accounting for <1% of all male cancers and <1% of all breast cancers
- Estimated 2,550 new cases and ~480 deaths expected in US in 2018
- Unlike in women where rates have stabilized, incidence in men < 40 yrs seems to be substantially increasing
- Men’s survival is lower than women’s
Cancer Statistics Prostate

Incidence rate is on the rise because of our aging male population

Risk factors:
- Age
- Family history
- African American heritage
- High fat diet
• Lifetime risk of developing prostate cancer is 1 in 5; fortunately only 3% will die from disease
• Estimated 164,690 new cases expected in US in 2018
  • Number of new cases expected to reach 380,000 by 2025 because of aging male population
• Estimated 29,430 deaths expected in US in 2018
  • 2nd leading cause of cancer deaths among US men
Cancer Statistics Colo-Rectal Cancer

- 3rd most common neoplasm worldwide; 2nd leading cause of cancer death in US
- Estimated that 140,250 Americans will be diagnosed with colorectal cancer in 2018
- Estimated deaths 450,630 in 2018
- 6% Americans are expected to develop the illness during their lifetime
- Over the past 15 years, the mortality rate has decreased by 1.7% yearly
Cancer Statistics Colo-Rectal Cancer

• 5 year overall survival rate is 64.5%. Despite advances in surgical technique and adjuvant therapy, only a modest improvement in survival in those diagnosed with advanced stage disease.

• 9 of 10 cases could be prevented if people >50 years led a healthy lifestyle and had regular screenings

• Risk factors include age, diet high in fat and calories and low in fiber, polyps, familial polyposis, women with history of ovarian, uterus or breast cancer, ulcerative colitis
Cancer Statistics Pancreatic

- 55,440 estimated new cases in the US in 2018
- 44,330 estimated deaths in 2018
- 12th most common type of cancer overall but highest in age group 65-74
- 3rd leading cause of deaths from cancer
- African Americans have appreciable higher rates than Caucasians
- Survival rates are dismal; majority diagnosed at advanced stage
- Five year survival rate is 8.5%
Risk Factors

Populations at risk, referred to as target groups, are targeted for interventions
Risk Factors

• Physical
• Lifestyle
• Occupational
• Environmental
• Biologic
• Iatrogenic
Risk Factors

- Age >65
- Tobacco account for 18,000 cancer related deaths a year
Lifestyle risk factors- Tobacco

• The highest priority in a national cancer plan is expansion of tobacco control- intervention with the largest potential health benefits

• More than half of the 26% decline in cancer mortality rates since 1991 is due to reduction in tobacco smoking

• Considerable evidence tobacco control can prevent more cancer deaths than any other primary prevention strategy
Lifestyle risk factors- Tobacco

• Tobacco smoking (active and secondhand smoke, remains the most common cause of:
  • cancers diagnosed (19.4%, n=304,880 in 2014)
  • cancer death (29.6%, n= 173,670 in 2014)
Lifestyle risk factors- Tobacco

NICOTINE

• Single most important cause of cancer mortality in the US
  • Accounts for 30% all cancer deaths
  • Accounts for 90% lung cancer cases [30% from secondhand smoke]

• Associated with cancers of the lung, trachea, bronchus, larynx, pharynx, oral cavity, esophagus, bladder, pancreas, kidney and cervix

• Synergistic effect with alcohol increasing the risk of mouth, throat, larynx and esophagus cancers
Lifestyle risk factors- Tobacco

• Annual direct healthcare costs of tobacco in the US:
  • $170 billion
  • $156 billion in lost productivity
Lifestyle Risk Factors- Alcohol Consumption

• Third most important major modifiable risk factor
  • Associated with 6.4% cancer in women
  • Associated with 4.8% cancers in men
• Contributes to 3% of cancer mortality
• Associated with cancer of the esophagus, liver, pharynx, stomach, colon, breast
  • As few as 2 drinks per day may contribute to breast, colon and rectal cancer
• Synergistic effect with tobacco
Lifestyle Risk Factors - Alcohol Consumption

• Among men and women combined:
  • 40.9% of oral cavity/pharynx cancers
  • 23.2% larynx cancers
  • 21.6% liver cancers
  • 21% esophageal cancers
  • 12.8% colorectal cancers

• In women 16.4% (39,060) breast cancers (2014)
Biologic Risk Factors

**Viral exposures**
- Associated with 15% of all cancers worldwide
- Implicated viruses include:
  - HIV
  - EBV
  - HPV
  - HTLV

**Familial and genetic contributions**
- Autosomal dominant
- Inherited genetic mutations [5-20%]
- Gene-gene or gene-environment interactions
- Inherited cancer
Lifestyle Risk Factors- Diet

- Accounts for 20-42% cancer deaths
- Overweight and obesity accounts for 20% of all cancer deaths in women and 12% in men
- Diets high in total fat, protein, calories, alcohol and meat and diets low in calcium and folate are associated with increased risk of colorectal cancer
- High fiber diet appears protective for cancers of the lung, colorectal, bladder, oral cavity, esophageal, stomach and cervix
Lifestyle Risk Factors-
Physical Inactivity

- Estimated that 2.9% of all cancer cases in US in 2014 were attributable to low physical activity
  - 26.7% uterine cancer
  - 6.3% colorectal cancer
Environmental Risk Factors

Accounts for 2% cancer deaths

- Sun exposure
- Electromagnetic field exposure
- Radon gas
- Contribution of cellular phone, microwaves and other wireless systems remains unclear
- Poor air & water quality
- Lack of adequate & safe food
Occupational Risk Factors

Account for 4% of cancers

- Asbestos is the single most important known occupational carcinogen [lung cancer, mesothelioma]
- Effective regulation of workplace exposures has reduced risks tremendously

- Special populations of concern;
  - Blue collar workers – increase smoking
  - African Americans- more hazardous jobs
  - Steel workers – increase lung CA
  - Rubber workers- increase prostate CA
  - Chemical workers- increased bladder CA
  - Miners- increased exposure to uranium and radon with a subsequent increase in gastric cancer
Iatrogenic risks

- Hormonal agents
- Anabolic steroids
- Certain fertility drugs (Pergonal)
- Growth hormones given to children
- Immunosuppressive agents [for organ transplant recipients]
- Antineoplastic agents (alkylating agents, anthracyclines)
Screening and Early Detection

• Screening increased the chance of detecting certain diseases early when they are most curable

• Cancer treatment much more effective when disease is found in its earliest stage
Different types of screening tests

- History and physical
- Laboratory tests
- Imaging
- Genetic testing
Screening and Early Detection

- Breast cancer screening: mammogram every 1-2 years for women over 40
- Cervical cancer screening: Pap smear every 3 years after the age of 21
- Colon and rectal cancer screening: colonoscopy at age 50
- Prostate cancer screening: prostate-specific antigen test (PSA)
- Testicular cancer screening: self-exam and clinical exam in younger males <35 years
Cancer Prevention
Risk Reduction

Research suggests that approximately 33% of cancers can be avoided through prevention
Research has shown that being overweight raises a person’s risk of getting uterine, prostate, breast and colorectal cancers.
Cancer Prevention

• According to the Institute of Medicine’s report “Fulfilling the Potential of Cancer Prevention and Early Detection”, the US is failing to take advantage of proven methods to prevent cancer.

• If sustained efforts were made to help people change their behaviors and were in place to take advantage of cancer detection procedures, 60,000 cancer deaths and about 100,000 new cases annually could be prevented.
Cancer Prevention

- For many health problems, a combination of primary, secondary and tertiary interventions are needed to achieve a meaningful degree of prevention and protection.

- Prevention involves the identification and manipulation of the genetic, biologic and environmental factors in the causal pathway of cancer.
Levels of Prevention

**Primary Prevention**
- Focus on prevention of any occurrence of disease, dysfunction, and health problems before they occur
  - Involve health promotion, identification of risks, and specific protections

**Secondary Prevention**
- Aim is to return the client to the highest level of functioning
  - Aim is to prevent further disability and to minimize risks associated with complications

**Tertiary Prevention**
- Involves early identification, diagnosis, and treatment limiting disability
Cancer Prevention

• LIFESTYLE to reduce the risk of cancer:
  • Quit smoking, or don’t start
  • No smokeless tobacco, ie. Chew
  • Diet rich in fruits and vegetables, and lower red meat and processed foods
  • Regular exercise
  • Decreased alcohol consumption
  • Healthy weight
Chemoprevention

Use of synthetic and natural substances that interfere with carcinogenesis during its early stages before invasive cancer can occur

Breast cancer
  • Selective estrogen modulators
    • Tamoxifen/ roloxifene

Prostate cancer
  • Alpha-reductase inhibitor
    • Finasteride

Colon cancer
  • COX-2 inhibitors
Cancer Defined

• An abnormal growth of cells which tend to proliferate in an uncontrolled way and, in some cases, to metastasize (spread)

• Cancer is not one disease

• It is a group of more than 100 different and distinctive diseases.
Cancer Defined

- Carcinogenesis is defined as the growth of cancer
- Oncogenesis is the maintenance of cancer
- Carcinogenic factors - cancer inducing
  - Primary factors - cancer as a molecular disease
    - Physical/chemical agents
  - Secondary factors - heredity/genetics
  - Favoring factors - risk factors
Cancer Defined

- Cancer is caused by changes in a cell's DNA
- Some changes may be inherited from our parents
- Others may be caused by outside exposures, such as:
  - Environmental Factors, i.e. Lifestyle factors, nutrition or physical activity
  - Naturally Occurring Exposures, i.e. Radon, ultraviolet light, infections
  - Medical Treatments, i.e. Radiation, chemotherapy (drugs that suppress the immune system)
  - Workplace Exposures, i.e. Asbestos
Carcinogenesis: Three-Stage Theory

- CARCINOGENESIS: The formation of a cancer

- Development of a cancer is a 3 step process:
  1. Initiation
  2. Promotion
  3. Progression
Carcinogenesis: Three-Stage Theory

• Initiation – an initiating agent may be chemical, physical or biologic, causing damage to DNA by changing a specific gene

• The gene may then:
  • Undergo repair
  • Become permanently damaged but not cause cancer unless subsequent exposures.
  • Become mutated and produce a cancer cell line if the initiator is a complete carcinogen (both and initiator and promoter)
Carcinogenesis: Three-Stage Theory

- Promotion – process of subsequent exposure to carcinogens.
- May alter genetic structure of cell or inhibit apoptosis of the cell.
- Results in:
  - Reversible damage to proliferation mechanism of the cell.
  - Irreversible damage to the proliferation mechanism of the cell, resulting in cell transformation.
Carcinogenesis: Three-Stage Theory

- Progression – increasing genetic instability (mutations) providing tumors a growth advantage
- Invasion
- Angiogenesis – (a target for therapy)
- Metastasis –
  - Direct invasion into local organ.
  - Seeding in a body cavity e.g. peritoneal cavity.
  - Dissemination via lymphatic system – entrapment in first LN, or skip to more distant sites.
  - Dissemination via the bloodstream – most common
Angiogenesis
Carcinogenesis: Causative Factors
Physical

• Ionizing radiation
  • Can develop 10 or more years after exposure
• Diagnostic sources
• Cosmic radiation
• Radioactive ground minerals, e.g., radon
• Ultraviolet radiation
• Sunlight
• Tanning salon
• Industrial sources, e.g., welding, solvents, pesticides
• Viruses
Carcinogenesis

Normal and Cancer Cells

Structure

Normal
- Large cytoplasm
- Single nucleus
- Single nucleolus
- Fine chromatin

Cancer
- Small cytoplasm
- Multiple nuclei
- Multiple and large nucleoli
- Coarse chromatin
Metastasis

Cancer spreads to other parts of the body

Lung metastasis

Brain metastasis

Primary cancer

Metastatic tumor

Cancer cells in the blood

Cancer cells in the lymph system

Primary cancer

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Characteristics of Cancer Cells
Structural Changes
Abnormal Chromosome Arrangements

• Genetic changes that can occur in Carcinogenesis result in the formation of abnormal chromosomes

• These abnormal chromosomes can then undergo 3 possible Processes:
  • Translocation
  • Deletion
  • Gene Amplification
Translocation
Deletion

In this slide, Chromosome 13 is missing the lower $\frac{1}{2}$ of the chromosome. This is a genetic marker that is looked for with the initial diagnosis of Multiple Myeloma and is considered a Poor Prognostic Marker. Individuals with this abnormality have a more aggressive myeloma.
Gene Overexpression or Amplification and Cancer
Diagnostics

- Lab
- Imaging
- Invasive Procedures
- Biopsies – tumor, bone marrow
- Colo – endoscopies
- Bronchoscopies
- ERCP
Diagnostics

Laboratory Testing

- Blood tests
- Urinalysis
- Tumor markers:
  - Prostate-Specific Antigen (PSA)
  - CA 125
  - Carcinoembryonic Antigen (CEA)
  - Alpha-Fetoprotein (AFP)
- Human Chorionic Gonadotrophin (HCG)
- CA 19-9
- Ca 15-3
- CA 27-29
- Lactate Dehydrogenase (LDH)
Diagnostics

### Diagnostic Imaging

- X-rays
- CT scans
- Ultrasonography
- Magnetic Resonance Imaging (MRI)
- Nuclear Medicine Imaging
Detection

- Physical exam and history
- Laboratory tests: samples of tissue, blood, urine, or other substances
- Imaging procedures
- Genetic tests: gene mutations linked to some types of cancer
Physical Exam

The Clinical Image of Collateral Circulation
Pet Scan

Initial Diagnosis

After 2 cycles
ABVD chemotherapy
CT Scan

- lung cancer
- emphysema

- cigarettes in shirt pocket
Bone Survey
Brain tumor cell using FISH
Staging

Classification: system used to help standardized diagnosis and treatment protocols

- Classification: process of naming the tumor, based on tissue of origin
- Grading: description of tumor aggressiveness
- Staging: describes the spread of cancer beyond tissue of origin
<table>
<thead>
<tr>
<th>Tissue of Origin</th>
<th>Benign Name</th>
<th>Malignant Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epithelium</td>
<td>Papilloma</td>
<td>Carcinoma</td>
</tr>
<tr>
<td>Gland</td>
<td>Adenoma</td>
<td>Adenocarcinoma</td>
</tr>
<tr>
<td>Liver cells</td>
<td>Hepatocellular adenoma</td>
<td>Hepatocellular carcinoma</td>
</tr>
<tr>
<td>Smooth muscle</td>
<td>Leiomyoma</td>
<td>Leiomyosarcoma</td>
</tr>
<tr>
<td>Connective tissue</td>
<td>Lipoma</td>
<td>Liposarcoma</td>
</tr>
<tr>
<td>Meninges</td>
<td>Meningioma</td>
<td>Malignant meningioma</td>
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<td>Neural tissue</td>
<td>Ganglioneuroma</td>
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<td>Plasma cells</td>
<td>Granulocytosis</td>
<td>Multiple myeloma</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>Granulocytosis</td>
<td>Lymphomas</td>
</tr>
</tbody>
</table>
Staging

STAGING:
process of finding out how much cancer there is in the body and where it is located
Staging

Solid Tumors: TNM refers to tumor size and how far the disease has progressed

T: tumor size

N: Nodal involvement

M: presence of metastasis
Lymphoma Staging

Ann Arbor Staging
Staging Hematologic Malignancies

Recurrent chromosomal abnormalities in Hematological malignancies

Abnormalities important for classification

- **CML**: t(9;22)
- **AML**: t(8;21), t(15;17), inv(16), t(9;11), inv(3), t(6;9), t(1;22), -5/5q-, -7/7q*
- **ALL**: t(4;11), t(1;19), t(v;11q23), t(12;21)*
- **MDS**: -Y, del(11q); del(5q), del(12p), del(20q); del(7q), +8, +19, i(17q); -7, inv(3)

**Lymphoma**

- **DLBCL**: t(3q27)
- **Burkitt**: t(8;14) and variant
- **Follicular**: t(14;18)
- **Mantle cell**: t(11;14)
- **Marginal zone**: t(11;18), t(1;14), t(14;18)
Grading of Tumors

- GX: Grade cannot be assessed (undetermined grade)
- G1: Well differentiated (low grade)
- G2: Moderately differentiated (intermediate grade)
- G3: Poorly differentiated (high grade)
- G4: Undifferentiated (high grade)
Metastases

- Most common sites: Bone, Lung, Liver, CNS
- They have to be able to break away from the original tumor and enter the bloodstream or lymph system, which can carry them to another part of the body.
- They need to attach to the wall of a blood or lymph vessel and move through it into a new organ.
- They need to be able to grow and thrive in their new location.
- They need to be able to avoid attacks from the body’s immune system.
Review Questions
What are the 3 stages in the process of Carcinogenesis?

A. Initiation, Translocation, Progression
B. Promotion, Initiation, Amplification
C. Initiation, Promotion, Progression
D. Initiation, Promotion, Amplification
Colon cancer prevention strategies include which of the following?

A. Reduction of red meat in diet
B. Modification of dietary fat intake
C. Pursuit of a diet rich in vegetables
D. Pursuit of a diet rich in fiber and vegetables
The three leading sites of cancer deaths worldwide are?

A. Lung, stomach and liver
B. Lung, breast and prostate
C. Lung, colorectal and pancreatic
D. Lung, skin and colorectal
From a client’s history, the nurse discerns that the client does not practice beast self-exam regularly, is a heavy coffee drinker, is infected with HPV and follows a diet that is high in fat, low in fiber, fruits and vegetables. Of these risk factors, which has been specifically linked to a type of cancer?

A. Lack of practice of monthly breast self-exam
B. Caffeine consumption
C. Infection with HPV
D. A diet high in fat, low in fiber, fruits & veggies
What Risk Factor is the most important cause of death in the United States?

A. Sun Exposure  
B. Alcohol  
C. Tobacco  
D. Viral exposures
According to a recent report by the Institute of Medicine, the United States could decrease cancer deaths and new cancer cases if the following were done?

A. Ban the use of alcohol  
B. People stopped eating red meat  
C. People changed their behaviors and a system was in place to allow people to take advantage of cancer detection procedures  
D. Prophylactic surgery was performed on patients at risk for developing cancer
The director of your state’s environmental health program has asked you to consult on the development of a new public health services grant proposal. The purpose of this grant is to significantly reduce the number of cancer deaths related to a select environmental cause. A focus on which of the following would potentially have the greatest public health impact?

A. Electromagnetic field exposure and childhood cancer
B. Cellular telephone use and cancer of the brain
C. Ultraviolet exposure and skin cancer
D. Hazardous waste dump exposure and leukemia
Ann Arbor Staging is used in what type of malignancy?

A. Lung Cancer  
B. Colon Cancer  
C. Breast Cancer  
D. Lymphoma