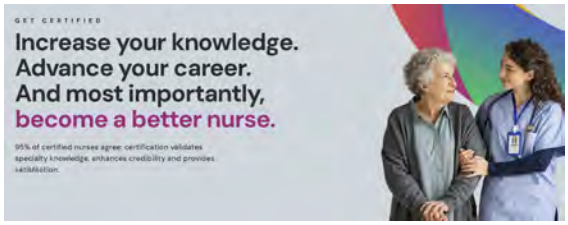
OCN® Test Review 2025



Mary MacKrell, RN, MSN, MEd, OCN, BMTCN

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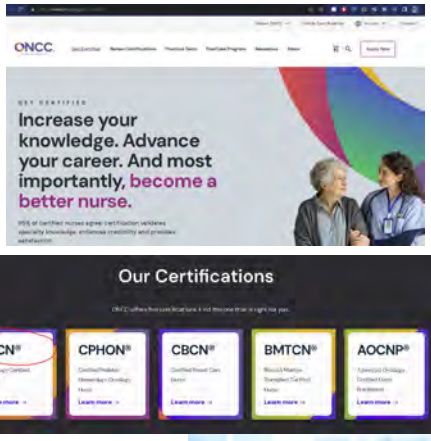

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OCN® Certification

- Formal recognition of specialized knowledge, skills and experience
- Accredited by National Commission for Certifying Agencies (NCCA)
- **Basic level** certification in adult oncology nursing practice
- Valid for 4 year
- Renewal by re-testing or Individual Learning Needs Assessment (ILNA) and Learningbuilder®

ONCC Certification Test Registration Manual, 2025

3

OCN® Certification Eligibility

- ✓ Current, active, unencumbered RN license at time of application
- ✓ 2 years RN experience within past 48 months
- ✓ 2000 hours adult oncology nursing practice
  - clinical practice, nursing administration, education, research or consultation
- ✓ 10 approved oncology nursing contact hours (5 hours may be oncology CME)

https://www.oncc.org/sites/default/files/2023-04/CertificationManual2023.pdf

ONCC Certification Test Registration Manual, 2025

4

Application Process

- No deadline for test application
- Obtain Nurysys NCSBN ID number and last four digits SSN
- ONCC will notify you to confirm your application has been received
- Authorization to Test (ATT) will be issued by PSI within 2 weeks of application
  - **email subject line will read "ONCC Authorization to Test"**
- Locate a PSI test site near you https://www.oncc.org/find-test-center
  - You must schedule the test within a 90-day window
  - After November 1st, a full 90-day window will open beginning in January

ONCC Certification Test Registration Manual, 2025

5

OCN® Test Content

- Test Blueprint based on 6 major subject areas
- Percentage assigned to each subject area
- Major subject areas are represented in every test
- **Not all content sub-areas are included on every test version**

ONCC Certification Test Registration Manual, 2025

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OCN® Test Content

- Care Continuum – 19%
- Oncology Nursing Practice – 17%
- Treatment Modalities – 19%
- Symptom Management and Palliative Care – 21%
- Oncologic Emergencies – 12%
- Psychosocial Dimensions of Care – 10%

ONCC Certification Test Registration Manual, 2025

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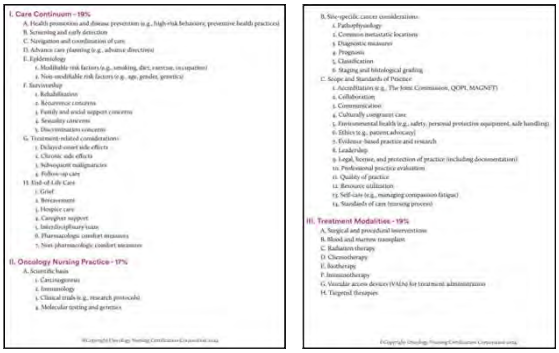
OCN® TEST CONTENT OUTLINE



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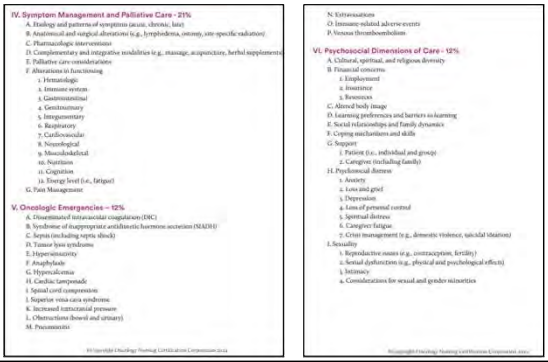
OCN® TEST CONTENT OUTLINE



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Test Structure

- 165 multiple choice questions
  - Includes 20 pre-test questions (experimental)
- 3 hours
  - average one minute per question
  - Includes 15 minutes tutorial
- Three types of questions
  - Knowledge i.e., fact
  - Application e.g., dose calculation or ANC calculation
  - Analysis e.g., case scenario requiring critical thinking

ONCC Certification Test Registration Manual, 2025

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Test Results

- Pass/Fail result upon test submission
- PSI will email test report within one hour of testing
- Report specifies scores within each 6 major subject areas
  - weaker to stronger score (below competence to above competence)

ONCC Certification Test Registration Manual, 2025

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Test Taking Tips

- ✓ Review normal lab values
  - Not *ONCOLOGY* expected/normal values
- ✓ Know generic or non-proprietary drug names e.g. filgrastim
- ✓ Make a fact sheet or flashcards

12

Test Taking Tips

- ✓ Read the question (stem) carefully but efficiently
  - Reflect on your nursing experience as you read a test question
- ✓ Tackle questions you know the answer to first
  - Bookmark questions, if uncertain
- ✓ Look for key words in the stem
  - ***Most common, priority, first action etc.***
- ✓ Think of the answer before reading the options
- ✓ Rely on your clinical nursing judgment
  - Do not change your answer unless, you're certain of the answer!

ONCC Oncology Nursing Certification Corporation
Credibility. Contribution. Care.

13

Test Anxiety and Self-worth

- Be confident
- Eliminate negative thoughts or social talk
- Don't worry about getting a perfect score
  - you are not your test results!
- Consider not sharing test date with others
  - Call your co-worker as you leave the test center with a "PASS" score!
- If at first, you don't succeed, prepare and try again!

ONCC Oncology Nursing Certification Corporation
Credibility. Contribution. Care.

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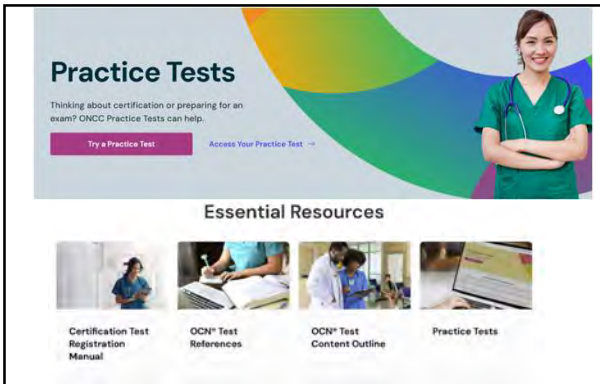

50 item free test plus practice tests for purchase
https://practicetests.oncc.org/
Allow one minute per question

15

Sample Question

1. **Nursing interventions for the management of nausea include encouraging patients to:**
   a. use spicy sauces and gravies.
   b. eat high-protein and high-potassium foods.
   c. consume more frequent meals with small portions.
   d. avoid brushing their teeth when they are nauseated.

Answer Key

1. c

Rationale: Nausea may be caused by cancer treatment or the disease itself. In addition to appropriate pharmacological management, patients should be taught to eat small, frequent meals to decrease nausea.

Reference: Yarbro, C.H., Wujcik, D., & Gobel, B.H. (Eds.). (2017). Cancer nursing: Principles and practice (8th ed.). Burlington, MA: Jones and Bartlett. p. 961(t).

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Test Reference Sampling

Backler, C. & Kirmse, J. (Eds.). (2023). *Access device guidelines: Recommendations for nursing practice and education* (4th ed.). Oncology Nursing Society.

Brant, J. (Ed.). (2023). *Core curriculum for oncology nursing* (7th ed.). Elsevier.

Bush, N.J., & Gorman, L.M. (Eds.). (2018). *Psychosocial nursing care along the cancer continuum* (3rd ed.). Oncology Nursing Society.

Eggert, J.A., Byar, K.L., & Parks, L.S. (Eds.). (2022). *Cancer basics* (3rd ed.). Oncology Nursing Society.

Haylock, P.J., & Curtiss, C.P. (Eds.). (2019). *Cancer survivorship: Interprofessional, patient-centered approaches to the seasons of survival.* Oncology Nursing Society.

Kaplan, M. (Ed.). (2018). *Understanding and managing oncologic emergencies: A resource for nurses* (3rd ed.). Oncology Nursing Society.

Katz, A. (2018). *Breaking the silence on cancer and sexuality: A handbook for healthcare providers* (2nd ed.). Oncology Nursing Society.

Mahon, S.M. (2021). *Understanding genomic and hereditary cancer risk: A handbook for oncology nurses.* Oncology Nursing Society.

Maloney-Newton, S., Hickey, M., & Brant, J. (2024). *Mosby's oncology nursing advisor: A comprehensive guide to clinical practice* (3rd ed.). Elsevier.

McQuestion, M., Drapek, L., & Witt, M. (Eds.). (2021). *Manual for radiation oncology nursing practice and education* (5th ed.). Oncology Nursing Society.

Olsen, M., LeFebvre, K.B., Walker, S.L., & Prechtel Dunphy, E. (Eds.). (2023). *Chemotherapy and immunotherapy guidelines and recommendations for practice* (2nd ed.). Oncology Nursing Society.

Olsen, M.M., & Walton, A.L. (Eds.). (2024). *Safe handling of hazardous drugs* (4th ed.). Oncology Nursing Society.

https://www.oncc.org/2024-ocn-test-references

17

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Study Resources

ONCC https://www.oncc.org

Practice Tests https://practicetests.oncc.org/

ONS https://www.ons.org

Evidence-based Practice https://www.ons.org/explore-resources

image: ONCC.org

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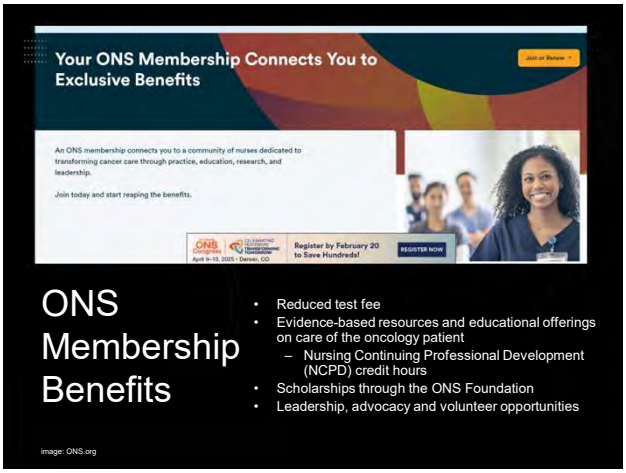

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OCN Test Review

Care Continuum

19% Test Content = 28 Questions

21

Care Continuum

- Health promotion and cancer prevention
- Screening and early detection
- Navigation and coordination of care
- Advance care planning
- Epidemiology
- Survivorship
- Treatment-related considerations
- End-of-life care

22

Question

Cancer epidemiology is defined as

A. incidence of cancer in a population.
B. number of new and existing cancer cases.
C. distribution and determinants of cancer in a population.
D. most common cancers in a population at risk.

23

Question

The worldwide leading cause of disease is

A. coronary artery disease.
B. cancer.
C. stroke.
D. chronic obstructive pulmonary disease.

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Global Cancer Statistics

- **Cancer is the leading cause of disease worldwide**
- 19.3 million new cases and 10 million deaths in 2020
- 28.4 million new cases and 16.3 million deaths expected by 2040 due to
  - Tobacco use
  - Poor diet
  - Smoking
  - Physical inactivity
  - Trends in reproductive health
    - Fewer births
    - Later age at 1st childbirth

WHO - International Agency for Research on Cancer (IARC), 2023

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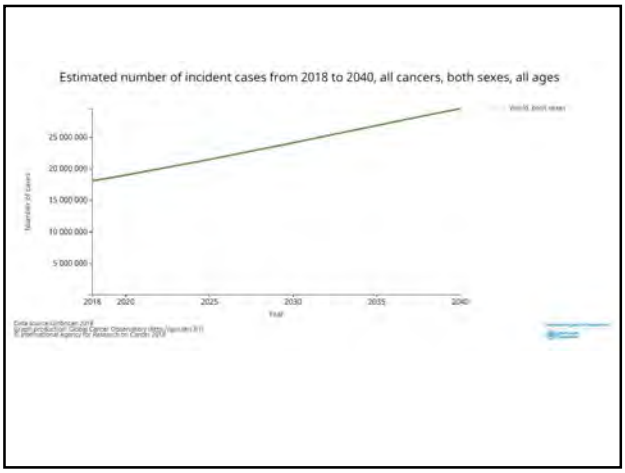

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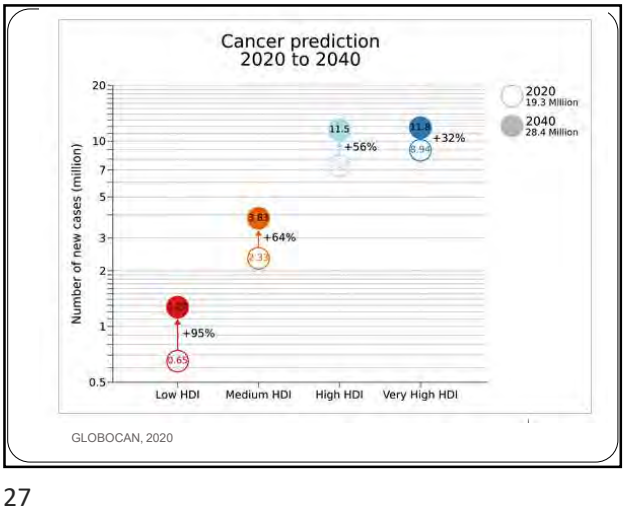


GLOBOCAN, 2020

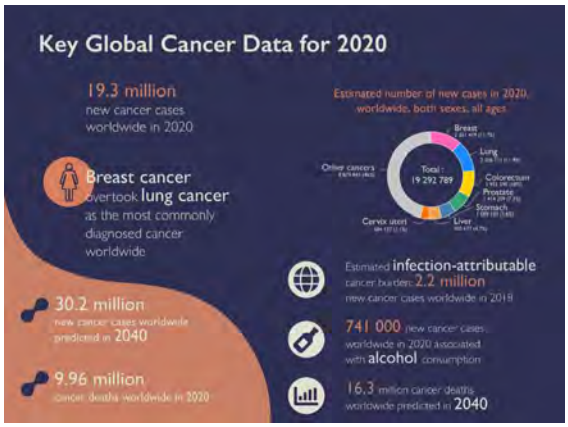
27

Question

The most globally diagnosed cancer is

A. lung.
B. stomach.
C. colorectal.
D. breast.

28



https://iarc.who.int/wp-content/uploads/2021/12/br2021-img-1.jpg

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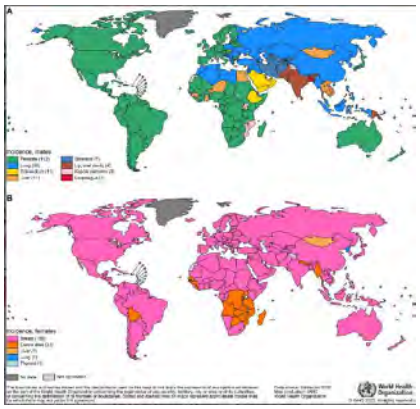


Source: GLOBOCAN, 2020

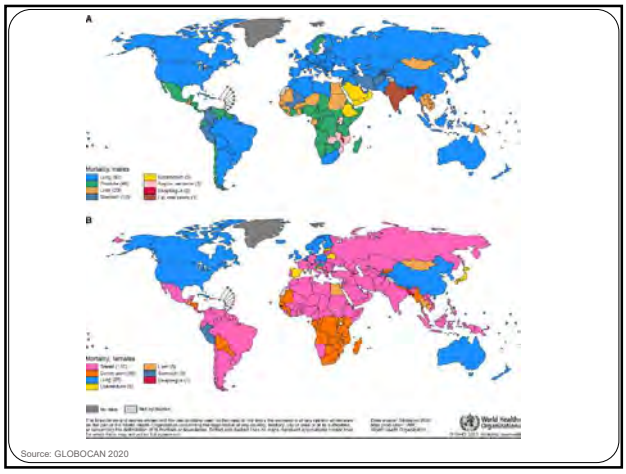
30

Global Cancer Mortality
Top 5 Incidence

Cancer Type	Mortality	Total Incidence Burden (%)
Lung	1.8 million	18
Colorectal	930,600	9.4
Liver	821,700	8.3
Stomach	762,300	7.7
Female Breast	683,100	6.9

International Agency for Research in Cancer (IRAC), 2020

31



Source: GLOBOCAN 2020

32

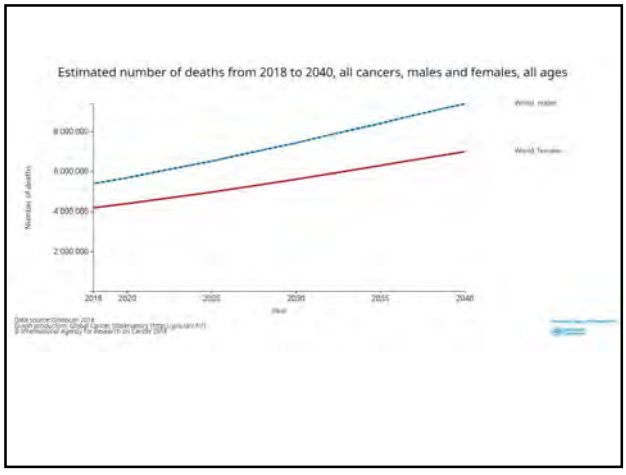


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Image: https://cancerstatisticscenter.cancer.org/

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U.S. Cancer Statistics

Cancer is 2nd leading cause of death
- 2nd to heart disease
- 1:4 deaths

"Silver Tsunami"
- 10,000 baby boomers turn 65-years-old every day

Risk of cancer increases with age
- 88% cancers diagnosed in 50+ age group
- 57% are 65 or older
- <1% pediatric age

18.1 million cancer survivors in 2022

American Cancer Society, Facts & Figures, 2024

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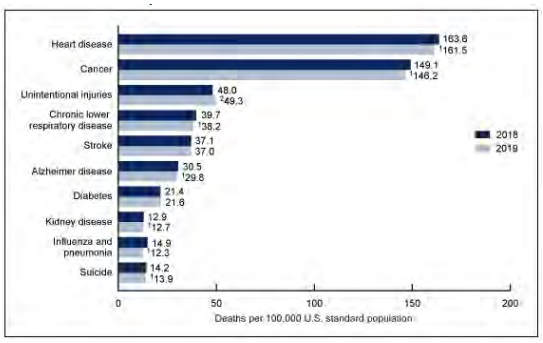

Age-adjusted death rates for the 10 leading causes of death in 2019: United States, 2018 and 2019

https://www.cdc.gov/nchs/products/databriefs/db395.htm

36

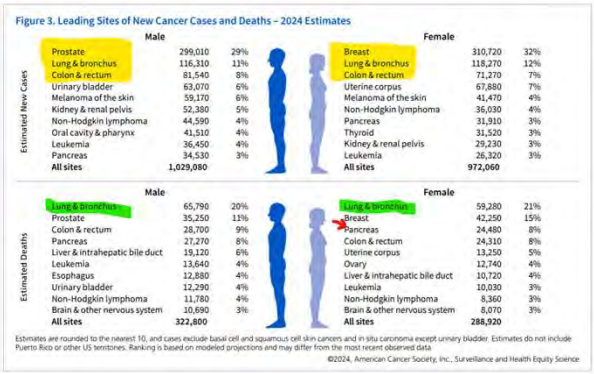
Figure 3. Leading Sites of New Cancer Cases and Deaths – 2024 Estimates

Estimated New Cases

Male			Female		
Prostate	299,010	29%	Breast	310,720	32%
Lung & bronchus	116,310	11%	Lung & bronchus	118,270	12%
Colon & rectum	81,540	8%	Colon & rectum	71,270	7%
Urinary bladder	63,070	6%	Uterine corpus	67,880	7%
Melanoma of the skin	59,170	6%	Melanoma of the skin	41,470	4%
Kidney & renal pelvis	52,380	5%	Non-Hodgkin lymphoma	36,030	4%
Non-Hodgkin lymphoma	44,590	4%	Pancreas	31,910	3%
Oral cavity & pharynx	41,510	4%	Thyroid	31,520	3%
Leukemia	36,450	4%	Kidney & renal pelvis	29,230	3%
Pancreas	34,530	3%	Leukemia	26,320	3%
All sites	1,029,980		All sites	972,060	

Estimated Deaths

Male			Female		
Lung & bronchus	65,790	20%	Lung & bronchus	59,280	21%
Prostate	35,250	11%	Breast	42,250	15%
Colon & rectum	28,700	9%	Pancreas	24,480	8%
Pancreas	27,270	8%	Colon & rectum	24,310	8%
Liver & intrahepatic bile duct	19,120	6%	Uterine corpus	13,250	5%
Leukemia	13,640	4%	Ovary	12,740	4%
Esophagus	12,880	4%	Liver & intrahepatic bile duct	10,720	4%
Urinary bladder	12,290	4%	Leukemia	10,030	3%
Non-Hodgkin lymphoma	11,780	4%	Non-Hodgkin lymphoma	8,360	3%
Brain & other nervous system	10,690	3%	Brain & other nervous system	8,070	3%
All sites	322,800		All sites	288,920	

Estimates are rounded to the nearest 10, and cases exclude basal cell and squamous cell skin cancers and in situ carcinoma except urinary bladder. Estimates do not include Puerto Rico or other US territories. Ranking is based on modeled projections and may differ from the most recent observed data.

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Image: American Cancer Society, Surveillance Research, 2021

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Cancer Incidence Rates
U.S. Trends

Steady decline in incidence for all races

- Lung
- Prostate (localized only)
- Breast
- Colorectal (age 50 and older)
- Thyroid

Cancer Facts & Figures, ACS, 2024

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Question

The oncology nurse is teaching a community program and includes education regarding incidence trends in the United States. Which of the following types of cancer have an increasing annual incidence?

A. Lung and prostate under age 50
B. Invasive breast cancer and colon under age 50
C. Stomach and larynx
D. Renal cell and acute leukemia

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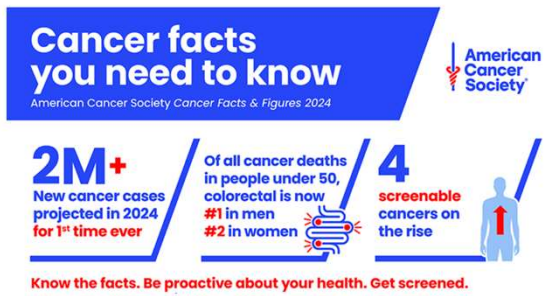

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Cancer Incidence Rates
U.S. Trends

Sites with ***increasing*** incidence

- Breast (invasive)
- Colon (under age 50)
- Prostate
- Multiple myeloma
- Renal cell
- Pancreatic
- Liver
- Bile duct

Attributed to obesity, alcohol, physical inactivity, poor diet and infection e.g., hepatitis and HPV

Cancer Facts & Figures, ACS, 2024

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Cancer Mortality Rates Decline
U.S. Trends

- Mortality rate dropped 33% since 1991
- Sites with decreasing mortality rate
  - **Lung (NSCL only)** - Stomach- Renal
  - **Prostate** - Ovary
  - **Breast** - Leukemia
  - **Colorectal** - NHL
  - Cervix - Melanoma
- **Lung cancer remains the leading cause of death**
  - 125,070 cases (21%) expected in 2024

Cancer Facts & Figures, ACS, 2024

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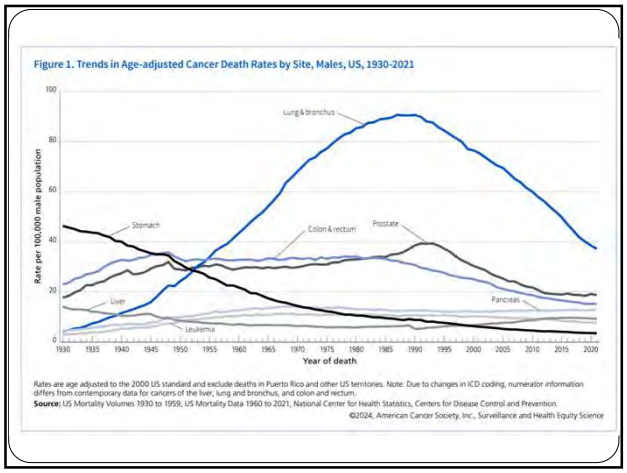

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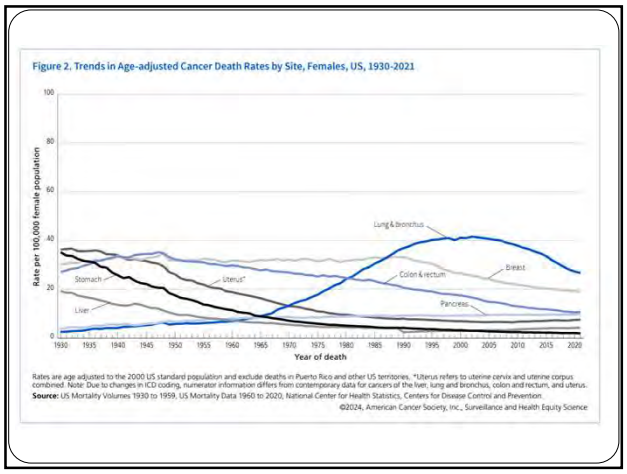

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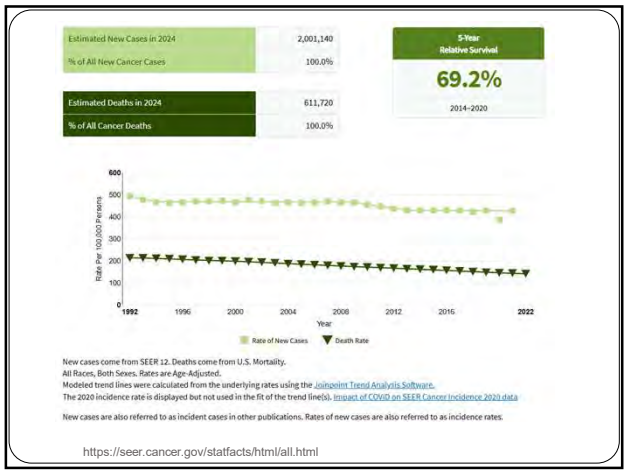

https://seer.cancer.gov/statfacts/html/all.html

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Social Determinants of Health (SDOH) Cancer Health Disparities

- Adverse differences in incidence, prevalence, mortality, survivorship and burden by:
  - Race/ethnicity
  - Age
  - Gender
  - Education
  - Geography
  - Income/poverty
  - Lack of health insurance
  - Medically underserved

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Cancer Health Disparity
Ethnicity and Race

Cancer	Highest Incidence Rate	Highest Mortality Rate
Breast	White Black/African American (NCI,2020)	Black/African American 40% higher mortality than White race
Cervical	Hispanic/Latina	Black/African American
Prostate	Black/African American Twice as likely to die than other racial groups	Black/African American
Lung, Colorectal, Liver and Stomach Cancers	Black/African American	Black/African American
Renal	Native American Alaskan Native	Native American Alaskan Native

Cancer Facts & Figures, ACS, 2024

48

Cancer Health Disparity
Age

- Risk of cancer increases with age
  - 88% all cancer diagnosed in 50+ years
    - 57% are 65 or older

Cancer Facts & Figures, ACS, 2024

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Cancer Health Disparity
Gender

Lifetime Risk

- Men - 1:2 (by age 76)
- Women - 1:3 (by age 85)

Cancer Facts & Figures, ACS, 2024

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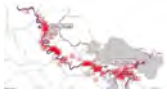
Cancer Health Disparity
Geography



- "Cancer Alley" Louisiana
  - 150 petrochemical plants polluting environment and low EPA standards
- White women in Appalachia have highest risk of cervical cancer in US
- Migratory data demonstrates adoption cancer pattern of the area suggesting causation by:
  - Lifestyle
    - smoking
  - Behavior
    - HPV risk
  - Environmental factors
- University of Virginia, with funding from National Cancer Institute, offer smoking cessation, HPV vaccination and self-testing kits for HPV to address disparity and decrease cervical cancer incidence and mortality

Cancer Facts & Figures, ACS, 2022; Image: UVA, 2019

51

Question

Which of the following is true about the association between social economic status and cancer incidence?

A. There is a decreased tobacco use among poor populations.
B. High economic status is associated with an increased risk of lung and cervical cancers.
C. More advanced disease at diagnosis is found among poor populations.
D. Low economic status is associated with an increased risk of breast and prostate cancers.

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Cancer Health Disparities - SDOH
Socioeconomic Status (SES)

- Low SES increases risk of lung, cervical, stomach and head and neck cancers
  - Tobacco use highly associated with low-income groups
- More advanced cancers at diagnosis in low income and rural population
- High SES associated with increased risk of breast, prostate and colon cancers

Cancer Facts & Figures, ACS, 2024

53

Question

The leading cause of cancer death in the US is

A. pancreas.
B. colorectal.
C. melanoma.
D. lung.

54

Question

Comparing the United States and worldwide current trends in cancer incidence, which of the following statements is true?

A. US incidence rate decreased, and the worldwide rate increased.
B. Incidence rates in the US and worldwide increased.
C. Incidence rates in the US and worldwide decreased.
D. US incidence rate increased, and the worldwide rate decreased.

55

Question

The leading preventable carcinogen of all time is

A. air pollution.
B. alcohol.
C. tobacco.
D. viruses.

56

Modifiable Lifestyle Risk Factor
Tobacco

- **Leading preventable carcinogen of all time**
- Includes secondhand exposure and smokeless tobacco
  - Products contain up to 70 carcinogens
- Accounts for 80% lung cancer deaths
- Accounts for 30% of all cancer deaths
  - 40% cancer deaths in males living in South and Appalachia

Cancer Facts & Figures, ACS, 2023

57

Tobacco-associated Cancer

19% of cancers are <u>caused</u> by smoking

- Lung
- Oral & pharynx
- Larynx
- Esophagus
- Stomach
- Colorectal
- Liver
- Prostate
- Breast*
- Pancreas
- Kidney
- Bladder
- Uterine
- Cervical
- Ovary*
- Acute Myeloid Leukemia

* increased risk of cancer

Cancer Facts & Figures, ACS, 2023

58

SDOH - Tobacco Usage

- Smoking prevalence decreased from 42% to 12% (1965-2021)
- More than 46 million US adults (19%) use a commercial tobacco product (2021)
- Smoking prevalence especially high among
  - Rural population
  - Native American or Alaska Native
  - LGBTQ community
  - Low income or education
  - Disabled
  - History of mental illness

Cancer Facts & Figures, ACS, 2023

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Health Disparity
Cigarette Smoking

- 21% of adult smokers have less than high school education compared to 3% with graduate degrees
- Uninsured 2x likely to be smokers
- **West Virginia has highest smoking prevalence (23%) compared to California and Utah (8%)**

Cancer Facts & Figures, ACS, 2023

60

Other Products

Cigars
- Increases risks of lung, oral cavity, larynx & esophagus
- 10x risk of death due to cancer than never-smokers
- Consumption increased by 92% (2000-2015)
  - 4% adults (6% men and 1% women)
- Highest among non-Hispanic black population

Chew
- Increases risk of oral, pancreatic and esophageal cancers

Waterpipe/Hookahs Smoking
- 1% high school students and 2% of adults (2021)

Nicotine pouch

Electronic Delivery Systems or Vaping Products)
- most used tobacco product in high school and middle school (2021)

Cancer Facts & Figures, ACS, 2023

61

Smokeless Tobacco Products

International Agency for Research on Cancer , 2020.

62

Question

Which one of the following statements is true regarding electronic delivery systems?

A. Electronic delivery systems are FDA-approved.
B. The use of electronic delivery systems are proven to reduce tobacco usage by teenagers.
C. Over two million children less than age 18 identify as users.
D. Electronic delivery systems do not contain nicotine.

63

Electronic Nicotine Delivery Systems (ENDS)

- 2 million students under age 18 identified as users in 2021
- Inhaled vapors contain concentrated nicotine, flavoring (diacetyl), chemicals and metals
- Use-associated lung injury (EVALI), caused more than 2,807 hospitalized cases or deaths due to vitamin E acetate and THC (February 2020)
- May lead nonsmokers, including children to begin smoking or use both products
  - 2016 FDA regulated http:fda/gov/TobaccoProducts
  - ONS supports efforts of https://www.tobaccofreekids.org/

ENDS are not proven to assist in smoking cessation

Cancer Facts & Figures, ACS, 2023

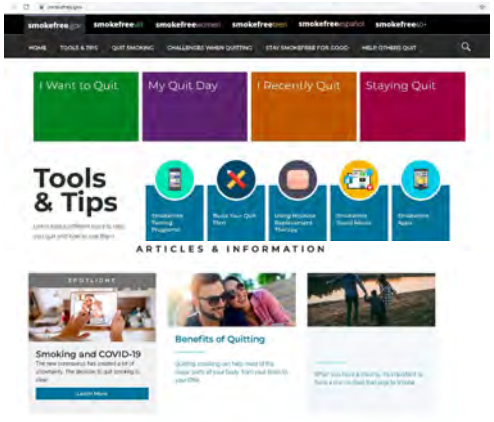
64

Promote Tobacco Cessation

- National & International efforts
  - CDC - "I'm ready to Quit"
  - ACS - "Great American Smokeout"
    - 3rd Thursday in November
    - Events & mobile games
  - NCI - Free help to quit smoking
    - Smokefree.gov
  - NIH - evidence-based tools
    - Quit Smoking
  - World Health Organization - "World No Tobacco Day"
    - May 31st

Image: CDC, SmokeFree.gov

65



66

- National goals to address modifiable risk factors and social determinants of health (SDOH) to reduce cancer incidence and mortality

Image: https://health.gov/healthypeople/objectives-and-data/browse-objectives/cancer

67

Question

A.C. is a 36-year-old female diagnosed with Stage 2 breast cancer. Her history includes a mother who died of ovarian cancer at age 50. Her body mass index is 35. She drinks alcohol on weekends and does not engage in any form of exercise. Which non-modifiable risk factor does A.C. present with?

A. Diet
B. Alcohol use
C. Family history of cancer
D. Level of inactivity

68

Non-modifiable Biological Risk Factors

Family or Personal History

Single Most Significant Risk Factor

- Breast cancer
- Skin cancer
- Colon cancer
- Ovarian cancer
- Retinoblastoma
- Neuroblastoma
- Wilm tumor

Cancer Facts & Figures, ACS, 2023; Image: clker.com

69

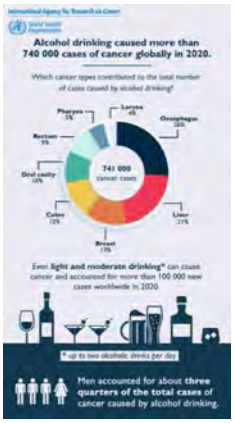
Modifiable Lifestyle Risk Factors

Alcohol Use

- Strong risk factor and cause of cancer (JCO Report, 2017)
- **Best not to drink alcohol**
- Limit alcohol consumption – daily (moderate use) consumption
  - 12 oz. beer, 5 oz. wine or 1.5 oz. alcohol
  - Males – 2 drinks
  - Females – 1 drink (smaller body and slower metabolism)
- Increases risk of oral, head and neck, esophageal, liver, colorectal, stomach, and female breast cancer
- Synergistic effect with tobacco
  - 30-fold increased risk of oral cancer

Cancer Facts & Figures, ACS, 2023

70



https://www.iarc.who.int/wp-content/uploads/2021/06/alcohol-drinking-world-zoom.jpg

71

Viral & Bacterial Exposures

- Hepatitis B (HBV) and C (HCV) virus
  - Liver cancer
- H. Pylori (bacteria) – Gastric cancer and non-Hodgkin lymphoma
- Human Papilloma Virus (HPV) – 100 types
  - Cervical cancer (HPV type 16 or 18)
  - Oral and oropharynx cancers (HPV type 16)
- Epstein-Barr Virus (EBV) – 90% world population seropositive
  - Burkitt and Hodgkin Lymphoma
  - Nasopharyngeal cancer
  - Gastric lymphoma
  - Parotid carcinoma

Cancer Facts & Figures, ACS, 2023

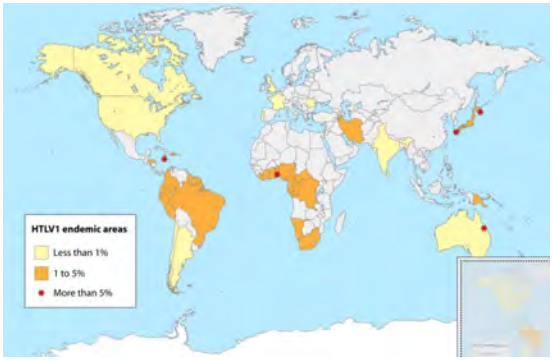
72

Viral Exposures

- Human T-cell lymphotropic virus 1 (HTLV-1)
  - Adult T-cell leukemia-lymphoma (ATLL)
  - Japan & Caribbean at risk population
  - 1:20 seropositive may develop leukemia/lymphoma
  - Transmission: sex, breastfeeding and blood
- Human immunodeficiency virus (HIV)
  - Kaposi sarcoma
  - NHL
  - Cervical
  - Anal
  - Lung (highest mortality)
  - Hepatocellular
  - Hodgkin

Cancer Facts & Figures, ACS, 2023

73



Proietti, F. A., A. B. F. Carneiro-Proietti, B. C. Catalan-Soares, and E. L. Murphy. 2005. Global epidemiology of HTLV-1 infection and associated diseases. Oncogene 24:6058-6068.

74

Modifiable Risk Factor
Occupational Exposure

- Accounts for 4% of all cancers
- Occupational asbestos exposure is single most known carcinogen associated with lung cancer and mesothelioma
  - mining, shipyards, railroads, construction, boiler plants, firefighting, oil refineries, and paper, textile and steel mills
- Exposure to soot, coal-tar base, radon, nickel, chromium, and smoke play a synergistic role in smoking-related lung cancers

Cancer Facts & Figures, ACS, 2023

75

Question

J.J. works in the oil and gas refinery. The oncology nurse knows the occupational exposure to benzene is associated with

A. leukemia.
B. lung cancer.
C. prostate cancer.
D. lymphoma.

76

Occupational/Environmental Exposure
Special Populations at Risk

Occupation/Population	Associated Cancer
Blue collar workers African Americans placed in hazardous jobs e.g. steel, rubber and chemical industries	Smoking-related cancers
Steelworkers	Lung
Rubber manufacturing	Prostate
Oil and gas refinery benzene exposure	Leukemia
Chemical, dye, and aluminum industry	Bladder
Farming Pesticide, herbicide, and organic chemicals	Lymphoma
Miners Uranium and radon gas exposure	Lung Gastric
Air pollution • power generation, transportation, and industrial and agricultural emissions	Lung
Contaminated drinking water (Arsenic)	Lung

Cancer Facts & Figures, ACS, 2023

77

Health Promotion
Prevention Strategies

78

Question

What role does obesity play in the development of cancer?

A. Obesity is the leading risk factor.
B. Obesity is the second leading risk factor in cancer development.
C. Obesity plays no role in cancer development.
D. Obesity is a protective factor in cancer prevention.

79

Excess Body Weight and Cancer

- 2nd only to tobacco use as a major risk factor
- Associated with 5% of cancers in men and 11% in women
- Contribute to 25% of cancer-related deaths
- Increases risk of 13 cancers: endometrial, esophageal, liver, stomach, renal cell, brain, multiple myeloma, pancreas, colorectum, gallbladder, ovary female post-menopausal breast, and thyroid
- Limited evidence increases risk of oral cancers, head and neck, male breast cancer, fatal prostate cancer, and diffuse large B-cell lymphoma

Cancer Facts & Figures, ACS, 2023

80

Weight Control

Healthy body mass Index (BMI)
- 18.5- less than 25 kg/m^2

Waist circumference
- <40" for males
- <35" for females

Overweight or pre-obese: 25 – less than 30 kg/m^2

Obese – BMI ≥30 kg/m^2

Extreme obesity – BMI ≥40 kg/m^2

CDC, 2019; ACS Cancer Facts & Figures, 2023

81

Obesity

Gender & Race

Rates (2017-2020)
Men - 42%
Women - 42%

Men	Women
• Hispanic 46%	• Black 59%
• White 44%	• Hispanic 46%
• Black 41%	• White 40%
• Asian 19%	• Asian 15%

Cancer Facts & Figures, ACS, 2023

82

ACS

Health Promotion

Choose healthy diet with emphasis on plant sources

Select foods and beverages to maintain healthy weight

Small portions

Choose vegetables, whole and low-calorie foods

Whole grain products

Limit sugar-sweetened foods

Limit red and processed meats

- Linked to increased risk of colon, and possibly prostate and other cancers

May be due to:
- increased iron and fat in red meat
- Salt and chemicals in processed meats
- Meat is cooked at very high temperatures

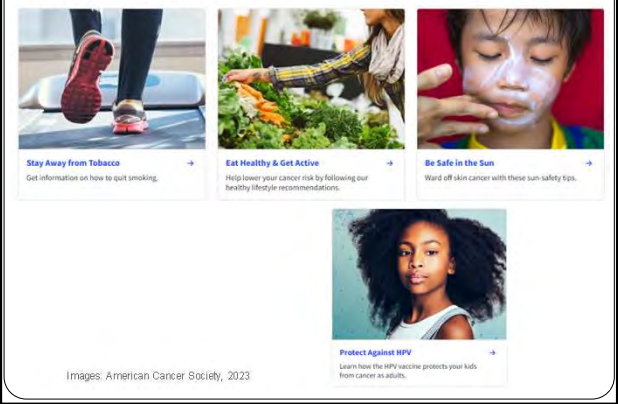
Consume 2½ cups vegetables and fruits daily (~5 servings).

Limit alcohol intake.

American Cancer Society, Facts & Figures, 2023

83

How to Lower Your Risk



Images: American Cancer Society, 2023

84

Physical Activity
ACS Recommendations

1. Intensity, duration & frequency of physical activity to reduce cancer risk is unknown.

2. Balance calorie intake with physical activity
   - Avoid excessive weight gain throughout life
   - Achieve and maintain healthy weight if overweight or obese

3. Maintain physically active lifestyle
   - 150 minutes moderate activity or 75 minutes op vigorous activity/week
   - Avoid sedentary behavior e.g., sitting, lying down, and watching TV

American Cancer Society, Facts & Figures, 2023

85

Exercise
Oncology Survivors

- Patients should receive information about regular exercise
  - Return to normal daily activities a.s.a.p. following diagnosis
  - Exercise at least 150 minutes per week
  - Include strength training at least 2 days per week
  - Tailor program to symptoms e.g., anemia, SOB, or heart failure
- Consume foods high in vegetables, fruits and whole grains
- Achieve and maintain healthy weight
- Encourage patients to access ACS online resources

American Cancer Society, Facts & Figures, 2023

86

Question

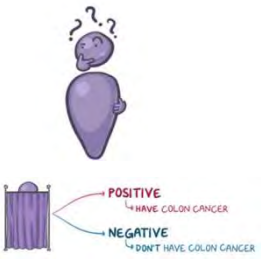
The oncology nurse is educating a Nurse Resident about cancer screening testing. The nurse explains, the percentage of persons who undergo mammography and have the disease is defined as

A. specificity.
B. positive predictive value.
C. negative predictive value.
D. sensitivity.

87

Effective Cancer Screening Tests

- **Positive Predictive Value** – percentage of persons who screen positive who have the disease (true positive)
- **Negative Predictive Value** – percentage of persons who screen negative who ***do not*** have the disease (true negative)



88

Oncology Nurse's Role
Assessment and Education

- Primary Prevention
- Secondary Prevention
- Tertiary Prevention

89

Question

A primary cancer prevention strategy for a 55-year-old male includes

A. prostate specific antigen screening.
B. digital rectal examination.
C. prostate biopsy.
D. healthy eating and a physical activity plan.

90

Question

A 35-year-old patient is scheduled for a bilateral mastectomy and breast reconstruction to reduce her risk of breast cancer. What type of prevention is this an example of?

A. Primary
B. Secondary
C. Tertiary
D. Quaternary

91

Question

A 30-year-old male is scheduled to receive a vaccination for human papilloma virus. What is this an example of?

A. Primary prevention
B. Secondary prevention
C. Tertiary prevention
D. Quaternary prevention

92

Oncology Nurse's Role
Assessment and Education

Image: ONCC.org, 2019

- Primary Prevention - Steps to avoid cancer
  - Lifestyle changes
  - Vaccination
  - High-risk group only
    - Chemoprevention
    - Prophylactic surgery
- Secondary Prevention
- Tertiary Prevention

93

Primary Cancer Prevention

Reduce cancer risk through individuals or groups:

Eliminate or reduce exposure to causative factors or carcinogenic exposure

- Lifestyle changes (diet, exercise, tobacco cessation, avoid or limit alcohol etc.)
- Vaccination

Chemoprevention in high-risk group
Selective estrogen receptor modulators (SERMs) to prevent breast cancer tamoxifen or raloxifene

NSAIDs, statins, and metformin to prevent stomach, gastric, and colorectal cancers

Prophylactic surgery in high-risk individuals

- Bilateral mastectomy and/or oophorectomy ("Brangelina Effect")
- Thyroidectomy
- Colectomy

Assess for fatalistic views i.e., cancer viewed as a death sentence rather than preventable

94

Question

The oncology nurse is discussing cancer prevention education by vaccination. Which of the following persons is a candidate for the human papilloma virus vaccine?

A. Alexis, a 7-year-old female.
B. Joseph, a 10-year-old male.
C. Lara, a 20-year-old pregnant female.
D. Ben, a 46-year-old bi-sexually active male.

95

Primary Prevention
HPV Vaccination

- Prevents cervical, anal, penile, vaginal, vulvar and oropharyngeal cancer plus genital warts
  - Quadrivalent (6, 11, 16 & 18)
  - 9-valent (6, 11, 16, 18, 31, 33, 45, 52 & 58)
  - Bivalent (16 & 18)
- 2-dose schedule: ages 9-14
- 3-dose schedule: ages 15-26 and immunocompromised persons
- Females
  - Gardasil®, Gardasil-9® or Cervarix®
- Males
  - Gardasil® and Gardasil-9®

ACS, 2019b

96

Primary Prevention
Hepatitis Vaccination

Hepatitis B vaccine

- First dose at birth
- Second dose at 1-2 months
- Third dose at 6 -18 months

All unvaccinated children, adolescents and adults at-risk should be vaccinated

CDC, 2021

97

Iatrogenic Risk

Therapy	Associated Cancer
Hormone replacement therapy (estrogen-progesterone HRT) in post-menopausal females Long-term use HRT	Breast Endometrial
Synthetic estrogen (Diethylstilbestrol)	Cervical and vaginal in offspring during late teens and early 20's
Gender-affirming Hormone Therapy (GAHT)	May increase risk of sex-driven cancers
Fertility drugs (Menotropin)	Ovary
Anabolic steroids	Liver
Growth hormones	Leukemia
Immunosuppressive medications (cyclosporin, tacrolimus, cellcept) Immunotherapies	Non-Hodgkin Lymphoma
Alkylating agents (platinum agents, melphalan, busulfan) Radiation Therapy	Subsequent cancers

100

Minimize Environmental Exposure

	Avoid direct sunshine between 1000-1600 hours
	Wear wide-brimmed hats and long-sleeved UV-protective clothing
	Use sunscreen SPF 30 or higher
	Avoid tanning beds and sun lamps
	Counsel fair skinned adults greater than age 24

American Cancer Society, Facts & Figures, 2023; Image: NASA/SDO/AIA in National geographic.org

98

Question

A secondary cancer prevention strategy for a 60-year-old female includes

A. education regarding adopting an exercise regimen.
B. dietary modifications.
C. mammography screening.
D. prophylactic bilateral mastectomy.

101

Ultraviolet Radiation

- Primarily sun exposure
  - Risk of melanoma, basal and squamous cell cancers
  - 91% of melanomas are attributed to URV
- Melanoma increased incidence over past 30 years due to
  - ↑ exposure to UV radiation
  - ↑ exposure to indoor tanning booths

American Cancer Society, Facts & Figures, 2023

99

Oncology Nurse's Role
Assessment and Education

Image: ONCC.org, 2019

- Primary Prevention - Steps to avoid cancer
  - Lifestyle changes
  - Vaccination
  - High-risk group only
    - Chemoprevention
    - Prophylactic surgery
- Secondary Prevention – Screening
  - Early detection of disease in asymptomatic population
  - Balance risk versus benefit
  - Identify high-risk individual
    - Gail, Claus and Tyrer-Cuzick risk models for breast cancer
    - PREMM model for colon cancer
  - Screening exams
- Tertiary Prevention

102

Question

AJ has completed colon cancer treatment and is counseled regarding the importance of follow-up survivorship appointments. Which level of cancer prevention is this an example of?

A. Secondary prevention
B. Tertiary prevention
C. Primary prevention
D. Quaternary prevention

103

Oncology Nurse's Role

Assessment and Education

Image: ONCC.org, 2019

- Primary Prevention
  - Lifestyle changes
  - Vaccination
  - High-risk group only
    - Chemoprevention
    - Prophylactic surgery
- Secondary Prevention
  - Early detection (screening) of disease in asymptomatic population
  - Balance risk versus benefit
  - Identification of high-risk groups
    - Gail, Claus and Tyrer-Cuzick risk models for breast cancer
    - PREMM model for colon cancer
- Tertiary Prevention
  - After effective therapy and rehabilitation
  - Monitoring for recurrence and long-term effects
  - May include screening for new primary cancer
  - May reduce morbidity and mortality

104

Cancer Prevention

Risk Assessment

105

Question

A nurse states, "10 out of 100 people developed cancer in our community this past year." This is an example of

A. incidence rate.
B. prevalence rate.
C. attributable risk.
D. relative risk.

106

Risk

Definitions

Incidence Rate

- Chance of developing cancer (incidence) or dying from cancer (mortality), in the general population, within a time period

Number of ***NEW*** cases
Population at Risk (general population)

- 10% of women developed breast cancer in 2022

Prevalence Rate

- percentage of new and existing cases with the disease at a given point in time
  - 4,000 cases of breast cancer in Broward County in 2024

Mahon, cited in Eggert et al. 2022

107

Risk

Definitions

Cumulative Risk

- Chance of developing cancer at a certain age along the lifespan
  - female breast cancer risk is

    2.4% at age 50
    3.5% at age 60
    4.1 % at age 70
    3% at age 80
    Lifetime cumulative risk=13%

Mahon, cited in Eggert et al. 2022

108

Question

A middle school student asks what effect smoking tobacco has on a person. The oncology nurse state "one in five people will die due to tobacco smoking." This is an example of

A. incidence rate.
B. absolute rate.
C. attributable risk.
D. relative risk.

109

Risk Definitions

Attributable Risk

Amount of disease that could be prevented by alteration of **risk factor**

1 in 5 deaths are **due to** smoking

Mahon, cited in Eggert et al. 2022

110

Risk Definitions

Relative Risk

Comparison of incidence, or mortality, among a **group** with a particular risk

Smokers are 1.2 times more likely to develop colorectal cancer **compared to** never smokers

Mahon, cited in Eggert et al. 2022

111

Question

The nurse is counseling a woman regarding regular mammography screening. According to the American Cancer Society, what age should annual screening begin?

A. 40
B. 30
C. 50
D. 45

112

Question

The nurse is counseling a patient regarding colon cancer screening. According to the American Cancer Society, what age should screening begin?

A. 50
B. 45
C. 39
D. 55

113

Cancer Site	ACS – 2025	NCCN - 2025	USPSTF
Breast	Age 40-44: Optional annual mammography **45-54: annual mammogram** 55+: Mammogram q2 years ***OR*** choice to continue annually, if in good health or 10+ years life expectancy	age 25- 40: clinical encounter q1-3 yrs. • Risk assessment • Breast awareness education age ≥40 • Annual clinical encounter • Annual mammogram Consider tomosynthesis-3D imaging	<age 50 • Individual informed decision mammogram q2 yrs. versus annually 50-74: mammogram q2 yrs. USPSTF (2016)
Colorectal	Age 45-75: One of following: • **Colonoscopy q10 years** • CT Colonoscopy q5 years • Sigmoidoscopy q5 years ***OR*** Stool-based test: • Annual guaiac fecal occult blood test (gFOBT) or Fecal Immunochemical Test (FIT) ***OR*** • Stool DNA (sDNA) test q3 years	Age 45-75: Follow ACS guidelines 76-85: Individualize	Age 45-75: Follow ACS guidelines 76-85: Selective screening USPSTF (2021)

American Cancer Society (ACS); National Comprehensive Cancer Network (NCCN); US Preventive Services Task Force (USPSTF)

114

Question

Which of the following men should begin screening for prostate cancer according to the American Cancer Society recommendation?

A. Ray, a 45-year-old African American
B. Jim, a 45-year-old Caucasian
C. Andrew, a 78-year-old Asian
D. Jesus, a 40-year-old Hispanic

115

Cancer Site	ACS – 2025	NCCN - 2025	USPSTF	
Cervical	**Annual Screening not Recommended** Age 25-65: Primary HPV test q 5years (preferred) ***OR*** Co-test (Pap test plus HPV) q5 years ***OR*** PAP test alone q3 years 65+: stop screening if test results negative within last 10 years Hysterectomy: Stop screening if unrelated to cervical cancer	Follow ACS guidelines	Age 21-29: Pap test q 3 years 30-65: Pap test q 3 years ***OR*** Co-test PAP & HPV test q 5 years USPSTF (2018)	
Prostate	**Age 50+** • PSA with or without digital rectal exam (DRE) • Informed discussion for men with at least 10-years of life expectancy regarding risks & benefits of screening • **If African ancestry, begin age 45**	Age 45-75: Average risk follow ACS guidelines 40-75: African ancestry, germline mutation or family history • PSA plus DRE • Screen q 1 – 2 years Age >75: individualize or stop	Age 55-69: Informed discussion Age 70+ Not recommended USPSTF (2018)	

American Cancer Society (ACS); National Comprehensive Cancer Network (NCCN); US Preventive Services Task Force (USPSTF)

116

Question

Which of the following individuals should be offered routine lung cancer screening according to the American Cancer Society recommendation?

A. Ray, a 55-year-old landscaper with a 20-pack year smoking history.
B. Gloria, a 50-year-old accountant with a 10-pack year smoking history.
C. Andrew, a 78-year-old retired teacher with a 30-pack year smoking history but quit smoking 20 years ago.
D. Carlos, a 40-year-old banker with a 15-pack year smoking history.

117

Cancer Site	ACS – 2025	NCCN - 2025	USPSTF- 2021
Lung	**Age 50-80** **Risk Assessment** • Occupational exposure – radon, coal, asbestos, cadmium, nickel, soot, chemicals etc. • 20 pack year history smoking or quit smoking in past 15 years • Smoking exposure (second-hand) **Annual low-dose spiral computer tomography scan** Stop screening after 15 years of smoking cessation		

• Shared decision-making discussion of risks and benefits

American Cancer Society (ACS); National Comprehensive Cancer Network (NCCN); U.S. Preventive Services Task Force (USPSTF)

118

Question

Which tumor marker is used to screen for cancer in the general population?

A. Carcinoembryonic antigen 125
B. Carcinoembryonic antigen
C. Carbohydrate antigen 19-9
D. Prostate-specific antigen

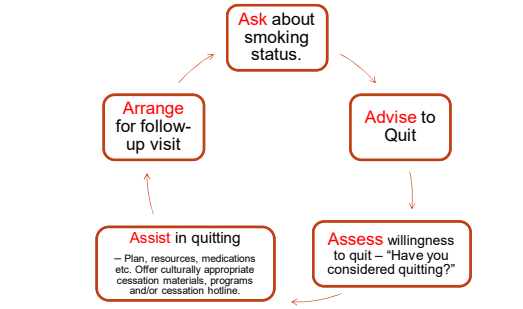
119

Biomarker Testing	Cancer Types
PSA – prostate-specific antigen Only biomarker FDA-approved for cancer screening	Prostate
CA 19-9 – carbohydrate antigen 19-9	Pancreatic Bile duct Gastric Gallbladder Ampullary Cholangiocarcinoma Lung Colon Breast
CA-125 – carcinoembryonic antigen 125	Colon Endometrium Pancreatic
CEA – carcinoembryonic antigen	Colon Lung Breast Pancreatic Ovarian
AFP – alpha-fetoprotein antigen	Hepatocellular Gastric Germ cell Lung

120

Health Promotion Education

Tobacco cessation – 5 "A"s model (US Public Health Service, CDC)

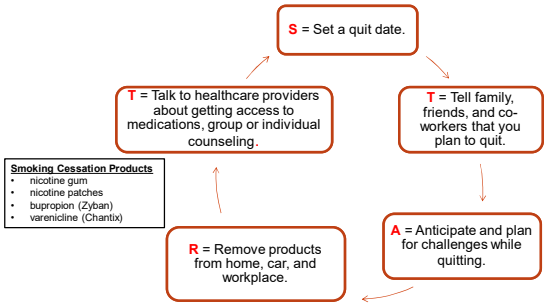


US Department of Health and Human Services, 2012

121

Health Promotion Education
Tobacco Cessation

START Method



Lancaster T, Stead LF. Individual behavioral counselling for smoking cessation. Cochrane Database of Systematic Reviews (2017) Issue 3. Art. No.: CD001292. DOI: 10.1002/14651858.CD001292.pub3.

122

Question

Key dietary strategies to prevent cancer includes

A. choosing fish, poultry, or beans as protein sources.
B. eating 1½ cups vegetables and fruits per day.
C. limiting alcohol to 3 drinks for men and 2 drinks per day for women.
D. limiting whole-grain products by eating refined-grain foods.

123

Question

Key component(s) of a client history to be obtained during cancer-oriented screening is

A. socioeconomic and insurance status.
B. marital status.
C. current medications.
D. personal and family history of cancer.

124

Question

Which of the following should be included in an educational session on obesity and its association with cancer?

A. A person is obese when the body mass index of 28 or greater.
B. Obesity is responsible for 50% of all cancers in the US.
C. More men are obese than women.
D. Obesity is the second leading risk factor.

125

Question

Which of the following interventions would potentially have the greatest impact regarding a smoking cessation program?

A. Education about cancer-related statistics associated with tobacco use.
B. Discuss Healthy People 2030 goals regarding tobacco use.
C. Offer relevant and culturally appropriate cessation materials and tobacco dependence medications.
D. Recommend use of e-cigarettes as a step to cessation.

126

Question

Which competency is specific to the role of an Oncology Nurse Navigator?

A. Contributing to oncology nursing journals.
B. Obtaining oncology nursing certification.
C. Assuming the role of a preceptor for newly hired nurses.
D. Coordinating care by identifying barriers to care and facilitating referrals.

127

Cancer Navigation

- Oncology nurse navigator (ONN), Social Worker, allied healthcare professional or trained lay navigators
- Role is to facilitate:
  - patients, families, and caregivers by overcoming healthcare system barriers
  - timely access to quality health
  - psychosocial care from prevention, detection and throughout all phases of cancer experience including survivorship

Shestha & Carr (2020)

128

Oncology Nurse Navigation Competencies

1. **Coordination of Care**
   Seamless transitions of care for past, current, or potential diagnosis of cancer
   - Patient Navigator
   - Financial Navigator
   - Oral Therapy Navigator
2. Communication
   - Assist patient and caregivers to overcome barriers
3. Education and Resources
   - Facilitate informed decision-making and timely access to quality care throughout continuum
   - Promote healthy lifestyle choices
4. Professional Role
   - Program development and quality improvement
   - Track metrics and patient outcomes

Academy of Oncology Nurse and Patient Navigators (AONN) and ACS LION program

129

Question

Which evidence-based instrument in oncology is most frequently used to determine a patient's style in choosing a treatment plan?

A. Decision Conflict Scale
B. OPTION tool
C. Satisfaction with Decision Scale
D. Pattern of Treatment of Decision Making

130

Patterns of Treatment Decision-Making Model (SDM)

Beaton JI, et al. Can Nurse. 1990; 86: 18-22. Image: Tariman et al. (2014). Older adults newly diagnosed with symptomatic myeloma and treatment decision making. *Oncology Nursing Forum*, 41 (4), 411- 419.

131

Agency for Healthcare Research and Quality (AHRQ) Shared Decision-Making Model (SDM)

5-step process:

1. Informing patient and family of choices (disease and treatment options).
2. Discussion of risks and benefits of each option.
3. Understand and incorporate what matters most (values, goals and priorities).
4. Decide on best course of action as a team.
5. Evaluate treatment decision.

132

Question

An advanced practice nurse has signed an order indicating what the patient's wishes are regarding cardiopulmonary resuscitation, transfusions and nutrition. This is known as a(an)

A. advance directives.
B. living will.
C. medical order for life-sustaining treatment.
D. healthcare surrogate.

133

Advance Care Planning

TYPE	DESCRIPTION	ADVANTAGES	DISADVANTAGES
Physician order for life-sustaining treatment (POLST) or medical order for life-sustaining treatment (MOLST)	Order signed by MD, ARNP or PA for specific level of resuscitation and care (antibiotics, transfusions etc.)	Portable from one setting to another e.g. home, hospital and clinic Copy kept in medical record	Not legal in all states
Advance Directive Living Will	Legal document outlining general wishes	Patient can list specific treatments be withheld or withdrawn	Not all states allow withholding nutrition or hydration May not be readily available
Durable Power of Attorney for Health Care	Legal document appointing a surrogate	Surrogate may authorize or withdraw treatment once decision-making capacity is affected	May not be clear if surrogate is adhering to patient's wishes

134

Survivorship Care Continuum

135

IOM Lost in Translation 2005 Video

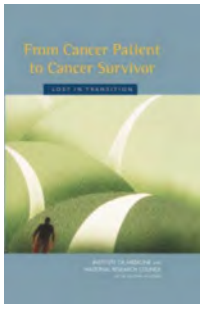
http://www.nationalacademies.org/hmd/reports/2005/from-cancer-patient-to-cancer-survivor-lost-in-transition/from-cancer-patient-to-cancer-survivor-lost-in-transition.aspx

136

Institute of Medicine (National Academy of Medicine)

From Cancer Patient to Cancer Survivor: Lost in Translation

- Survivorship care is neglected
- Cancer recurrence, secondary (subsequent) cancers and late effects of treatment need to be addressed
- Few guidelines
- Providers lack education



Institute of Medicine, *From cancer patient to cancer survivor*, 2005

137

Institute of Medicine

Delivering High Quality Cancer Care - System in Crisis 2015

Image: https://www.youtube.com/watch?v=gGrj1t_gX2g

138

Question

The term “survivor” in oncology practice best refers to

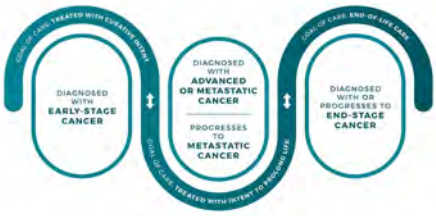
A. someone who is given the diagnosis of more than one cancer.
B. someone who recurs after a primary cancer.
C. a person who has a family member also diagnosed with cancer.
D. anyone with a cancer diagnosis and his or her social network.

139

Definition of Survivorship

“**An individual is considered a cancer survivor from the time of diagnosis through the balance of his or her life.**” (Cancer Nation, 2025)

This includes survivors living with cancer and those free of cancer are impacted. *(NCCN, 2025)*



https://cancercontrol.cancer.gov/ocs/definitions November 17, 2022; NCCN Cancer Survivorship, 1.2025.

140

Question

Ana, is a 63-year-old woman diagnosed with stage 1 triple negative breast cancer. She underwent a lumpectomy with sentinel lymph node biopsy. Compared to survivors of hormone receptor positive breast cancer, Ana is at a higher risk of

A. cardiomyopathy.
B. peripheral neuropathy.
C. osteoporosis.
D. cancer recurrence.

141

Survivor
Ana

- Initial treatment included adjuvant partial breast RT followed by 4 cycles of taxotere and cyclophosphamide
- 3 years later, Ana develops a 1 cm. tumor recurrence and undergoes a bilateral mastectomy followed by adjuvant chemo adriamycin and cytoxan (4 cycles) and taxotere (4 cycles)

142

Question

The nurse knows Ana should be monitored for signs and symptoms of

A. vaginal stenosis.
B. diarrhea.
C. cardiotoxicity.
D. proteinuria.

143

Survivor
Ana

- 18 months later, Ana develops biopsy-proven metastatic disease involving the medial chest wall
- Restaging studies demonstrate disease progression including lung and liver (visceral disease)
- Other systemic treatments included zoledronic acid, carboplatin and gemcitabine
- She receives 3 treatments of internal RT to liver lesions with yittrium-90 SIR-spheres treatments

144

Survivor
Ana

- She is currently being evaluated for treatment of a lung lesion with CyberKnife® stereotactic radiosurgery but has presented to the Emergency Department, two days ago, and was found to be in atrial fibrillation
  - admitted to the medical ICU
- Converts to NSR and transfers to the oncology unit
- Now Ana is complaining of left-sided weakness including the lower extremities

145

Question

Considering Ana's symptoms, the nurse should be most concerned about the possibility of

A. chest wall recurrence.
B. brain metastasis.
C. axillary lymph node involvement.
D. skeletal fractures.

146

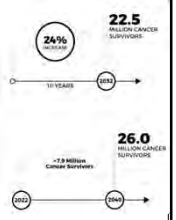
Survivor
Ana

- CT of brain without contrast demonstrate multiple lesions in the right central cranial hemisphere
- started on dexamethasone and reports "excellent improvement"
- Patient reports no aphasia or slurred speech
- She continues to have left upper extremity weakness, as well as lower extremity, with no difficulty ambulating
- Radiation therapy consult requested for whole brain radiation

147

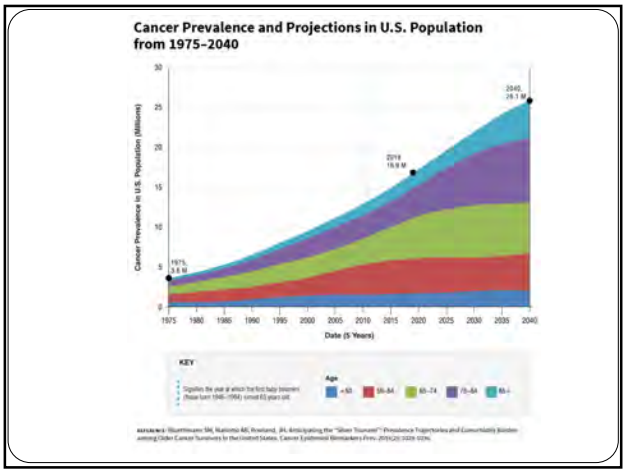
Survivorship Facts

Over 18.1 million survivors in US (NCI, 2023)	• 26.1 million expected by 2040
Growing number of elderly survivors	• 67% are 65 or older
Rural survivors face resource challenges	
Survivors from minority populations	• Growing number of young adults who were diagnosed as children needing transition to adult long-term follow up (LTFU)
Culturally diverse population of survivors	



Corcoran , S. (2020). Survivorship. In *Core Curriculum for Oncology Nursing*; NCI https://cancercontrol.cancer.gov/ocs/statistics#graphs .

148



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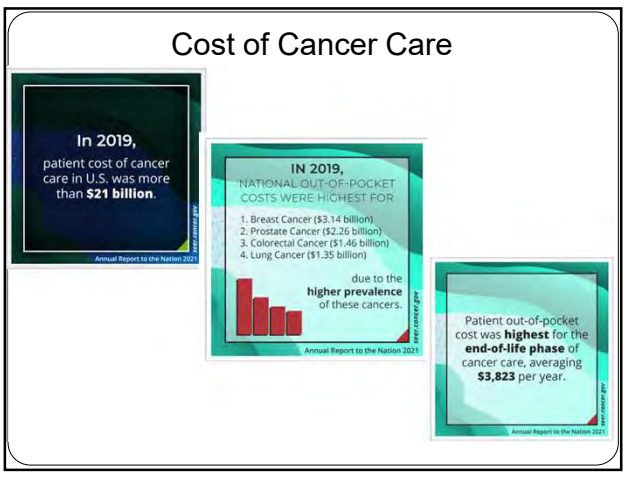
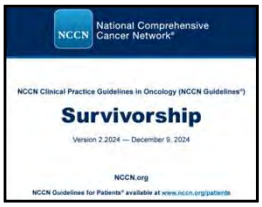


150

Survivorship Guidelines

- 64% cancer patients have survived 5 years or more
  - 15% survived 20 years
  - 5% survived 30 years
- Most common cancer survivors (58%)
  - Breast
  - Prostate
  - Colon/Rectum
  - Melanoma

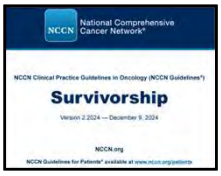


National Comprehensive Cancer Network Clinical Practice Guidelines in Oncology (v2.2024). *Survivorship.*

151

Survivorship Assessment and Guidelines

- Areas of focus
  - Healthy lifestyle behaviors
  - Immunizations
  - Cardiovascular disease risk assessment and modifications
- Common issues
  - Anthracycline-induced cardiac toxicity
  - Anxiety, depression, trauma, and distress
  - Cognitive decline
  - Fatigue
  - Lymphedema
  - Hormone-related symptoms
  - Pain
  - LGBTQ resources
  - Female and male sexual dysfunction
  - Sleep disorders



National Comprehensive Cancer Network Clinical Practice Guidelines in Oncology (v2.2024). *Survivorshi.p*

152

Long-term and Late Effects
Definitions

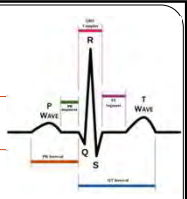
Long-term effect
(Chronic)
Begins as a complication of treatment, persists throughout treatment, and may continue after treatment is completed e.g., neuropathy

Late effect
(Delayed Onset)
Begin after treatment is completed, may be absent or subclinical at the end of treatment, and may be present years later e.g., cardiomyopathy

Lasting effects of cancer and its treatments affect a patient's quality of life.

153

Long-term and Late Effects
Cardiovascular



- Congestive heart failure
- Cardiomyopathy
- Carotid artery disease
- Valvular heart disease
- Electrical or conductive system disease
- Effusions

Corcoran , S. (2024). Survivorship. In *Core Curriculum for Oncology Nursing 7th ed.* (pp. 20–27).

154

Cardiac Late Effects
Monitoring Guidelines

- Heart failure may take years to decades to manifest
- For high-risk patients (hypertension, diabetes, hyperlipidemia, smoking, obesity, alcohol use)
  - thorough cardiac workup for heart failure recommended 1 year after completing anthracycline therapy
- For patients who received trastuzumab, pertuzumab, VEGF inhibitors and taxanes in combination with anthracyclines
  - serial 2-D ECHO

National Comprehensive Cancer Network. (2024, v2.2024). Survivorship Clinical Practice Guidelines in Oncology.

155

Question

E.P. is a 30-year-old man who received bleomycin for Hodgkin disease. He is interested in learning a new exercise activity. Which activity should be discouraged based on his medical history?

A. Scuba diving
B. Tennis
C. Running
D. Golf

156

Long-term and Late Effects Pulmonary

- Pulmonary fibrosis
- Restrictive lung disease
- Effusions
- Dyspnea

Corcoran , S. (2024). Survivorship. In Core Curriculum for Oncology Nursing 7th ed.(pp. 20–27).

157

Long-term and Late Effects Gastrointestinal

Malabsorption
Dysphagia
Gastroesophageal reflux disease [GERD]
Hepatitis
Constipation
Diarrhea
Weight gain
Cachexia

Corcoran , S. (2024). Survivorship. In Core Curriculum for Oncology Nursing7th ed. (pp. 20–27).

158

Long-term and Late Effects Bone

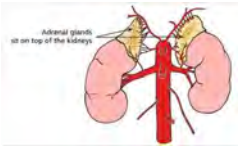
- Osteopenia
- Osteoporosis
  - Vertebral fractures
- Avascular necrosis joints (steroid-induced)
- Atypical femoral fracture (bisphosphonates and RANKL inhibitor therapy)

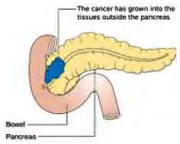
Corcoran , S. (2024). Survivorship. In Core Curriculum for Oncology Nursing 7th ed. (pp. 20–27).

159

Long-term and Late Effects Endocrine

- Hypothyroidism
- Adrenal insufficiency
- Diabetes



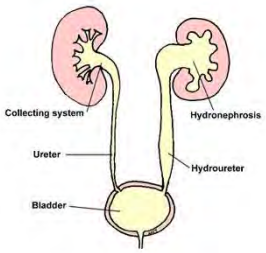


Corcoran , S. (2024). Survivorship. In Core Curriculum for Oncology Nursing 7th ed.(pp. 20–27).

160

Long-term and Late Effects Genitourinary

- Chronic kidney disease
- Proteinuria and albuminemia
- Incontinence
- Ureter obstruction
- Bladder atonia



Corcoran , S. (2024). Survivorship. In Core Curriculum for Oncology Nursing 7th ed. (pp. 20–27).

161

Question

A.T. is receiving denosumab for breast cancer. She calls the clinic to inform them of a scheduled dental procedure and cannot come in for treatment today. The nurse should be concerned about the possibility of

A. dental caries.
B. oral infection.
C. xerostomia.
D. osteonecrosis of the jaw.

162

Long-term and Late Effects Oral

- Xerostomia
- Dental Caries
- Osteonecrosis of Jaw (ONJ)

Corcoran , S. (2024). Survivorship. In Core Curriculum for Oncology Nursing 7th ed. (pp. 20–27).

163

Question

What is the nurse's best response to a patient complaining of fatigue eight months after a hematopoietic stem cell transplant?

A. "Your energy should have returned by now."
B. "You should take more frequent naps."
C. "Tell me what exercises you are engaging in."
D. "I can ask the doctor to prescribe medication for you."

164

Long-term and Late Effects Sensory – Neurological

- Fatigue
- Hearing loss
- Visual changes
- Taste changes
- Loss of smell
- Neuropathy
- Lymphedema
- Insomnia

Corcoran , S. (2024). Survivorship. In Core Curriculum for Oncology Nursing 7th ed. (pp. 20–27).

165

Long-term and Late Effects Reproductive & Sexuality

- Hormonal deficits
- Sexual dysfunction
  - Vaginal dryness
  - Vaginal atrophy
  - Erectile dysfunction
- Loss of libido
- Changes in body image

Corcoran , S. (2020). Survivorship. In Core Curriculum for Oncology Nursing (pp. 20–27). Elsevier.

166

Long-term and Late Effects Psychological

- Anxiety
- Depression
- Trauma
- Distress
- **Fear of recurrence**

Corcoran , S. (2024). Survivorship. In Core Curriculum for Oncology Nursing 7th ed. (pp. 20–27).

167

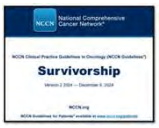
Question

JD is a cancer survivor and states, "I'm having nightmare and can't help thinking my cancer will come back. I want to visit and say "hello" to my favorite nurses on the oncology unit, but I just can't do it. JD is expressing signs and symptoms of

A. anxiety.
B. trauma.
C. uncertainty.
D. depression.

168

Trauma Screening Questions



In the past 2 weeks have you….

1. Had nightmares or thoughts about cancer or treatment when you did not want to?
2. Tried not to think about events related to your cancer or went out of your way to avoid situations that reminded you of those events?
3. Been constantly on guard, watchful, or easily startled?
4. Felt numb or detached from people activities or your surroundings?
5. Felt guilty or unable to stop blaming yourself or others for events during your cancer treatment or other events?

- **If "yes" to >3 questions, refer to mental health providers skilled at trauma counseling**
- If "yes" to <3 questions, screen at regular intervals

National Comprehensive Cancer Network Clinical Practice Guidelines in Oncology (v2.2024). *Survivorship.*

169

Long-term and Late Effects Social

- Changes in roles and relationships
  - Emotional withdrawal
  - Isolation
  - Guilt
  - Depression
  - Anxiety
  - Intimacy issues

Corcoran , S. (2020). Survivorship. In Core Curriculum for Oncology Nursing (pp. 20–27). Elsevier.

170

Long-term and Late Effects Cognitive Function

- Forgetfulness or memory loss
- Inability to concentrate
- Difficulty word finding or thought expression

Corcoran, S. (2024). Survivorship. In Core Curriculum for Oncology Nursing 7th ed., pp. 20–27.

171

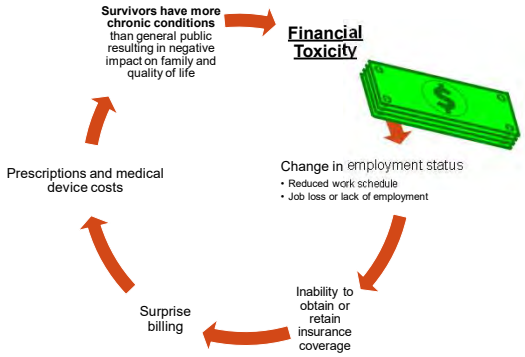
Question

SM states, "I can't afford the co-pay to refill my prescription." Which the following referrals is most appropriate?

A. Integrative medicine
B. Oncologist
C. Clinical psychologist
D. Social Worker

172

Financial Long-term and Late Effects



Corcoran, S. (2024). Survivorship. In Core Curriculum for Oncology Nursing, 7th ed., pp. 20–27.

173

Question

MJ, a newly diagnosed breast cancer survivor, is tearful and shares that her daughter also tested positive for a cancer genetic variant. This is an example of

A. post-traumatic stress disorder.
B. anxiety.
C. survivor guilt.
D. transmitter guilt.

174

Long-term and Late Effects Spiritual Concerns

Meaning of illness
- Renewed view of self
- Changed view of self or place in the world/community/family
- Uncertainty

Transcendence
- Dealing with life-threatening diagnosis and treatment

Finding inner strength
- Persistent suffering

Religious faith
- Changes in religious values and beliefs

Corcoran, S. (2024). Survivorship. In Core Curriculum for Oncology Nursing...

175

Risk of Disease Recurrence and Subsequent Malignancies

- **Adult survivors of childhood cancers have greatest risk of developing 1 or more subsequent cancers**
  - **Accounts for 20% of cancer deaths**
- Hodgkin survivors have increased risk recurrence and subsequent malignancies related to chemotherapy and/ RT
- Women who received chest wall RT, as children or adolescents, have significant risk of breast cancer

Corcoran, S. (2020). Survivorship. In Core Curriculum for Oncology Nursing (pp. 20–27). Elsevier.

176

Subsequent Malignancies

Subsequent cancers associated with RT within treatment field include
- Skin cancers
- Soft tissue sarcomas
- Thyroid cancer
- Breast cancer
- Lung cancer

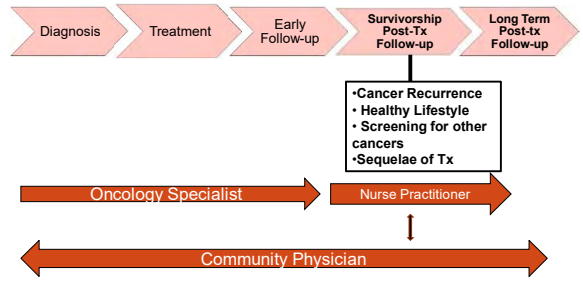
Surveillance recommended for young women who received 20+ Gy of chest RT for breast cancer
- Mammogram with MRI starting at 25 years of age or 8 years post-RT

Surveillance recommended for RT doses 30+ Gy to colon or rectum
- Colonoscopy every 5 years at age 35 or 10-years post-RT

Corcoran , S. (2020). Survivorship. In Core Curriculum for Oncology Nursing (pp. 20–27). Elsevier.

177

Survivorship Distinct Phase



Corcoran, S. (2024). Survivorship. In Core Curriculum for Oncology Nursing, 7th ed., p. 23.

178

Survivorship Care

Essential Components

- Information on treatment received and planning for survivors
- Assessment to detect recurrence
- Identification & management of delayed-onset and chronic side effects
- Screening for new primary cancers
- Health promotion recommendations
  - **5lb. Weight loss or 5% body weight decreases 10-year risk of all-cause mortality by 64% in ER+/PR+ early-stage breast cancer** (Women's Intervention Nutrition Study, 2001)
  - **Controlling growth factors, inflammation & glucose levels thought to be protective**
- Communication with primary care physician and other providers

Corcoran, S. (2024). Survivorship. In Core Curriculum for Oncology Nursing, 7th ed., pp. 20–27.

179

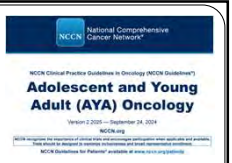
Question

Which of the following survivors has an increased risk of depression, anxiety, post-traumatic stress disorder, and substance use disorder?

A. Sam, a 24-year-old leukemia
B. Nicole, a 73-year-old breast cancer
C. Larry, a 50-year-old colon cancer
D. John, an 82-year-old skin cancer

180

Adolescent and Young Adult Survivorship



- 15-39 years at time of diagnosis
- Distinct tumor biology
  - Tumor banking and clinical trial enrollment
- Genetic counseling
- Chemotherapy
  - dose intensity and dose density associated with improved outcomes
- Monitor cumulative doses
- Treatment-related issues including long-term monitoring
  - Cardiotoxicity – anthracyclines
  - Hearing and renal function – cisplatin
  - Pulmonary - bleomycin
  - Neurotoxicity – platinum agents
  - Fertility and pregnancy
  - Growth and development

National Comprehensive Cancer Network. (v2.2025). Adolescent and Young Adult (AYA) Oncology Clinical Practice Guidelines.

181

AYA Survivor

- Career
  - **School**
  - **Employment**
- Social support and adjustment
  - **Self-esteem**
  - **Strengths/resilience**
  - **Relationships**
  - **Future goals**
- Cognitive function
- Emotional health
- Vaccinations
- Dental health
- Palliative and end-of-life care

Unique Concerns

- Homeless or unstable living environment
- Fertility
- Sexual functioning and referrals
- Gender identity
- Parenting
  - Patient/parent involvement with judicial system or legal status or immigration issues
- Education
- Employment attainment and retention
- Adherence to medications
- Psychological assessment and support
  - Anxiety
  - Depression
  - Trauma and PTSD
  - Substance use disorder

NCCN Adolescent and Young Adult (AYA) Oncology Clinical Practice Guidelines, 2.2024.

182

Question

The nurse is teaching S.T., a 72-year-old cancer survivor, who is prescribed an oral oncolytic agent. Which of the following responses would be most effective in supporting medication adherence?

A. "Be sure to take the drug at 1000 pm every night."
B. "Please tell me, in your own word, when you will take this drug?"
C. "Let me know when I can speak with your daughter about taking this drug."
D. "Call me when you receive the drug from the pharmacy and I will let you know when to take the drug."

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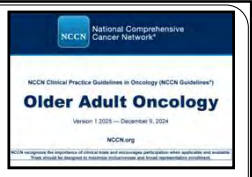
Older Adult Survivor



- No chronological age
- Bone Marrow Suppression
  - Immunizations & Infections
- Mucositis
- Neurotoxicity
- Functional status and falls
- Nutrition
- Cardiac Toxicity
- Renal Toxicity
- Cognitive Function
- Exercise
  - Fatigue
- Insomnia

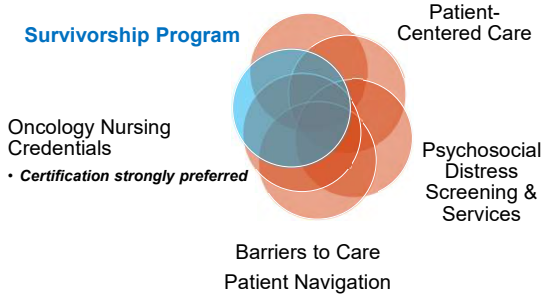
Unique Concerns

- Validated geriatric screening tools
  - Comprehensive Geriatric Assessment (CGA)
- Decision-making algorithm
- Therapy adherence
- Polypharmacy
- Financial toxicity
- Palliative care

National Comprehensive Cancer Network. (v1.2025). Older Adult Oncology Clinical Practice Guidelines older_adult.pdf

184

2020 Commission on Cancer Standards

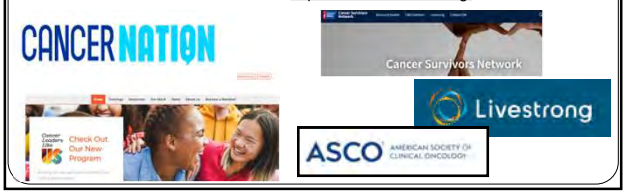


American College of Surgeons. (2024, December). *Optimal Resources for Cancer Care 2020 Standards.*

185

Cancer Survivorship Care Plan and Resources

- American Cancer Society Cancer Survivors Network https://csn.cancer.org/
- Livestrong https://www.livestrong.org/what-we-do/program/livestrong-guidebook
- American Society of Clinical Oncology https://www.asco.org/practice-policy/cancer-care-initiatives/prevention-survivorship/survivorship-compendium
- Cancer Nation formerly National Coalition for Cancer Survivorship https://canceradvocacy.org/
- National LGBT Cancer Network https://cancer-network.org/



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National Cancer Institute
Office of Cancer Survivorship

- Research Studies
  - Funding and grant opportunities
- Resources
  - Patient and caregiver
  - Professional
- Statistics
- Advocacy
- New resource toolkit 2024

National Standards for Cancer Survivorship Care

Health System Policy | Health System Processes | Health System Evaluation/Assessment

https://cancercontrol.cancer.gov/ocs/special-focus-areas/national-standards-cancer-survivorship-care

Image: https://cancercontrol.cancer.gov/ocs

187

Cancer Survivorship
Federal Law Protection

Americans with Disability Act (ADA)	• Prohibits discrimination from employers, unions and agencies • Exempts employers with less than 15 employees • Does not cover active military
Family and Medical Leave Act	• Provides 12 weeks unpaid job leave (continuous or intermittent) during a 12-month period • Employee must work at least 25 hrs/week for 1 year • Exempts employers with less than 50 employees

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Cancer Survivorship
Federal Law Protection

Consolidated Omnibus Budget Reconciliation Act (COBRA)	• Extension of health care benefits due to voluntary or involuntary job loss
Employee Retirement & Income Security Act (ERISA)	• Prohibits private employers from setting health benefits based on health status • Prohibits "encouraging" disabled employee to retire • Prohibits job termination based on health status

189

Cancer Survivorship
Federal Law Protection
DHHS/CMS

Consumer Information & Insurance Oversight (CIIO)
cms.gov/cciio

- Oversees implementation of provisions related to private health insurance
- Work closely with state regulators, consumers, and stakeholders to ensure **Affordable Care Act** best serves American people

Consumer Assistance Program

Provides resources necessary to help educate and provide accurate information to consumers

190

Question

Cardiomyopathy, pulmonary fibrosis, and sterility are examples of

A. reversible effects once treatment has ended.
B. early toxicities from cancer therapy.
C. late-onset effects of cancer therapy.
D. inevitable side effects of cancer therapy.

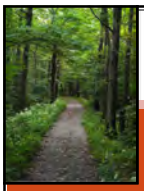
191

Question

Which of the following statement accurately describes a psychosocial effect of long-term survivors?

A. Most cancer survivors have severe and permanent psychological adjustment problems.
B. After cancer treatment, there is rarely any need for continued psychosocial support.
C. Family members typically remain overprotective and reactive to any new indication of illness.
D. Fear of recurrence may persist for many years.

192

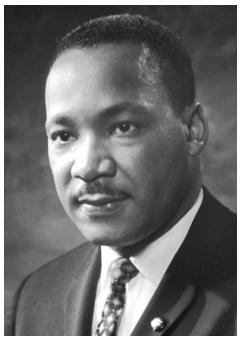


OCN Review Course

End-of-Life Care

193

"It does not matter how long you live, but how well you do it."
Martin Luther King, 1968

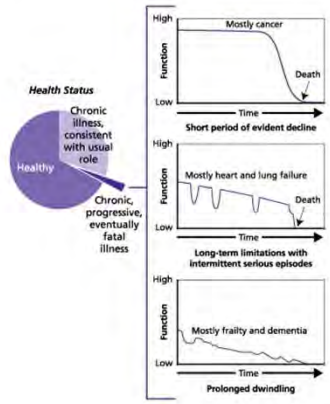


194

"The last stages of life should not be seen as defeat, but rather life's fulfillment…One of the ways we can help our patients more is to learn to believe and to expect this".
- Dame Cicely Saunders, 1965

195

Chronic Illness Elderly in America
Disease Trajectories



Lynn, Joanne and David M. Adamson, Redefining and Reforming Health Care for the Last Years of Life. Santa Monica, CA: RAND Corporation, 2006. https://www.rand.org/pubs/research_briefs/RB9178.html.

196

IOM Report 2014
Dying in America: Improving Quality and Honoring Individual Preferences Near the End of Life

Ensure end-of-life care is
- Compassionate
- Affordable
- Sustainable
- Best quality possible

Institute of Medicine. (2014). Dying in America: Improving Quality and Honoring Individual Preferences Near the End of Life. The National Academy of Science. https://www.facs.org/media/whmfnppx/2020_coc_standards.pdf

197

IOM Report 2014
Key Findings and Recommendations

- Delivery of Person-centered and Family-oriented Care
- Clinician–Patient Communication and Advance Care Planning
- Professional Education and Development
- Policies and Payment Systems
- Public Education and Engagement

Institute of Medicine. (2014). Dying in America: Improving Quality and Honoring Individual Preferences Near the End of Life. The National Academy of Science. https://www.facs.org/media/whmfnppx/2020_coc_standards.pdf

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Question

When estimating prognosis or survival time, physicians usually

A. underestimate survival time.
B. overestimate survival time.
C. accurately estimate survival time.
D. avoid estimating survival time.

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End-of-Life Care Issues

- Physicians are overly optimistic when estimating prognosis
  - Overestimate survival time by **factor of 4** (Soliman et al., 2018)
  - Late referral to hospice
    - 50% of patients **die or discharged within 18 days** of admission
    - Median length of stay is **18 days**

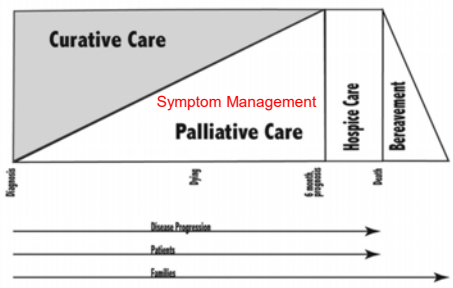
Possible Reasons

- Referrals may be delayed in pursuit of potentially curative therapies.
- Physician may be reluctant to discuss hospice i.e. "giving up".
- Eligibility criteria confusing or not in line with patient's goals or wishes.
- Lack of perceived support in hospice services
  - Patients and families wish to stay in acute care setting
- Rapid clinical decline at EOL may make transition to hospice logistically difficult.
- Hope and will to live is strong i.e., cultural, strong healthy family, young patients with children etc.

Hospice and Palliative Care Organization, 2021

200

Palliative and Hospice Care



A continuum of care including bereavement counseling

201

Palliative Care Levels of Expertise

- Primary palliative care
  - Basic symptom management and advance care planning care skills provided in clinic and home
- Secondary palliative care
  - Oncologists and interdisciplinary team provided at hospital or treatment/cancer center
- Tertiary palliative care
  - Complex case management provided by trained interdisciplinary palliative care team e.g., board-certified physician or fellowship, APRN, social worker, and spiritual care provider

Elliot, K. & Patterson, K. H. (2024). Palliative and End-of-life Care. In Brant, J.M., et al. (Eds.), Core Curriculum for Oncology Nursing 7th ed

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Hospice Definition

- Provides care when prognosis is **6 months or less**
  - Certified by referring physician and hospice medical director
- A form of palliative care
- National Consensus Project for Quality Palliative Care
  - Mission to create clinical practice guidelines that improve the quality of palliative care
    - Clinical Practice Guidelines for Quality Palliative Care, 4th Ed. (2018)
    - Developed by 16 expert national organizations with palliative care and hospice experience
    - Endorsed by 80 national organizations

https://www.nationalcoalitionhpc.org/ncp/

National Hospice and Palliative Care Organization. (2018). Clinical Practice Guidelines for Quality Palliative Care 4th Ed. National Coalition for Hospice and Palliative Care

203

End-of-Life Nursing Education Consortium (ELNEC)

ELNEC

National end-of-life educational program administered by City of Hope Cancer Center and American Association of College of Nursing (AACN)

Supported by NCI, ONF, US Department of Veterans Affairs, ASCO, Hospice and Palliative Nurses Association (NHPNA), and Sigma Theta Tau Honor Society

Image: https://www.aacnnursing.org/ELNEC

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Hospice Care
History

1960's - founded by Cicely Saunders at St. Christopher Hospice in London, England

Focus on caring and life closure

Canadian physician, Dr. Balfour Mount, chose the term "palliative", rather than hospice, to best describe improvement in care for patients facing a serious illness

US - 1970's first hospice movement initiated by Dr. Florence Wald, Dean Yale University School of Nursing

1974 – 1st hospice opened in US by Connecticut Hospice - Brantford, CT

- Affiliated with CT hospitals
- Provide inpatient, pediatric & home care services

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Hospice Care
History

1978 National Hospice & Palliative Care Organization founded

1982 - Medicare hospice benefit approved by Congress based on outcomes of interdisciplinary team providing symptom control i.e. not curative therapies

Patient waives right to traditional care

MD certifies prognosis less than 6 months

- Certifications can extend beyond 6 months

Private insurance hospice benefit modeled after Medicare hospice benefit

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Palliative Care
Resources

NHPCO National Hospice and Palliative Care Organization

Medicare-certified hospice programs
- Range in location and size
- National Hospice & Palliative Care Organization http://nhpco.org

Service Delivery Models
1. Acute inpatient consultative teams
2. Acute palliative care units (APCUs)
3. Outpatient palliative care or supportive care clinics
4. Community-based palliative care programs
5. Hospice care setting

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End-of-Life Care Concepts

- Art and science of life closure
  - meeting needs of patient and family as death nears
- Acknowledge dying as part of life cycle
- Provide relief from distressing symptoms
- Provide medical aid in dying where state law permits
  - CA, CO, DC, HI, MT, MA, NJ, NM, OR, VT, and WA
  - Court approval required
- Support of family during and following death

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Question

F.N. is a 58-year-old man, diagnosed with end-stage lymphoma and has received several lines of treatment. He is admitted with shortness of breath, pain and confusion. The family wants "everything done." He has a large, fungating open wound in the left axilla where the lymphoma has broken through the skin. His attending physician has signed treatment plan for an off-label use of an immunotherapy. Phase 1 trials did not determine the ideal dose for lymphoma. To manage the patient's confusion, orders include holding all morphine and sedatives. The nurse's priority is to

A. request an ethics consult to clarify the goals of care.
B. build trust with the patient and family.
C. provide patient education on immunotherapy.
D. withhold morphine and sedatives as ordered.

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Oncology Nurse As Advocate

PATIENT & FAMILY NEEDS	TASKS/ROLE
Lack of knowledge related to cancer treatment	Educate about chemotherapy, RT, other treatments, procedures, possible side effects, precautions, and follow-up needs
Lack of knowledge about advance directives	Provide information about types of advance directives Facilitate communication to complete advance directives
"Disconnect" between patient's expressed goals and treatment goals	Facilitate communication between key team members (physician/patient/family member) Coordinate team meetings Seek ethics consults prn
Lack of knowledge about end-of-life care	Provide information Assist in planning and delivery of care

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Question

More distress and prolonged caregiver grief are experienced when patients die

A. alone.
B. in a hospice setting.
C. in a hospital setting.
D. at home.

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Patient and Family
Needs During End-of-Life Care

- Shared decision-making model of care delivery
- Symptom control
  - **Edmonton Symptom Assessment System (ESAS) tool**
- Honor Advance care directives
  - Durable Power of Attorney
  - Living Will
- Location of death
  - Preference may vary depending on race, ethnic group and symptom burden
  - 50% of cancer patients prefer to die at home
  - Hospital deaths are associated with more physical and emotional distress and more prolonged caregiver grief than home hospice deaths
- How to spend final days
- Finding meaning in the experience
- Funeral arrangements

Fink, R. M., & Robinson , N. (2020). Palliative and End-of-life Care. In Brant, J.M., et al. (Eds.), Core Curriculum for Oncology Nursing (pp. 28–41). Elsevier

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Oncology Nurse's Role

Oncology Nurses are Critical Participants in Care by

- Encouraging touch and spending time together
- Honoring days or hours of life remaining
- Keeping activities as normal as possible for children
- **Value "being with" versus "doing for"**
  - *"Healing Presence"*
- Respecting patient's wishes and needs

Image: KatrinaMayer.com

ONS, Palliative Care for People with Cancer Position Statement, 2022.

213

Caregiver Strain and Burden
Family and Friends

Risks include increased cardiovascular disease, psychosocial stress, fatigue and depression

Factors that influence impact include general resilience, relationship to patient, symptom distress, and degree of challenge to everyday caregiving (presence of dementia and help with physical care)

Financial burden due to loss of income or costs of medical care

Positive benefits include decreased mortality, positive affect and pride in accomplishments

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214

Robert Pope. *The Visitors.*

215

Performance and Functional Status
Assessment Tools

- Palliative Performance Scale
  - Functional domains (0-100%)
    - Ambulation
    - Activity level and burden of disease
    - Self-care
    - Oral intake
    - Level of consciousness
- Eastern Cooperative Oncology Group (ECOG) Performance Status 0-5
  - Abnormal score if ≥3
- Karnofsky Performance Scale
  - Abnormal score if <50%

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Patient and Family Unit Evaluation and Support

- **Social Work Assessment tool (SWAT)**
  - Validated by NHPCO (2007)
- **Evaluation of Patient-family Unit**
  - Physical and mental health
  - Functioning and conflict
  - Nature of relationship to patient
  - Financial situation
  - Difficulty of caregiving requirements
- **Teach Caregiving Skills**
  - Physical care
  - Provide written instructions
  - Reinforce teaching with interactions and feedback
  - Ensure caregiver knows who to call with questions

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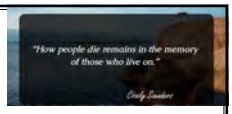
Caregiver Support Interventions



- **Address physical burden**
  - Use of assistive devices
  - OT/PT consult to teach safe transfer techniques
  - Turning and positioning
  - Use of home health aides and homemaker services
  - Encourage calling family, friends, faith community for assistance with specific tasks
- **Anticipate and teach symptom control**
  - Medications and non-pharmaceutical methods
    - Who to call for questions or assistance
  - Change in level of care, if required i.e., respite care or inpatient unit

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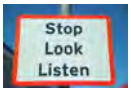
Caregiver Support Interventions



- **Provide psychosocial and emotional care**
  - Active listening to fears, concerns and grief response
  - Clarify goals and advance care plan
  - Augment support services by referrals to social worker, chaplain, counselors & community resources, volunteers etc.
  - Encourage self-care
  - Communicate changes in patient condition such as signs and symptoms of imminent death
  - Assessment Tool – Caregiver Reaction Assessment

https://nadrc.acl.gov/sites/default/files/uploads/docs/Caregiver%20Reaction%20Scale.pdf

O'Malley, K., & Qualls, S. H. (2017). Preliminary evidence for the validity and reliability of the Caregiver Reaction Scale. Clinical Gerontologist, 40, 281-294. doi: 10.1080/07317115.2016.1198858

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SPIKES
Communication Tool for Delivering Bad News

- **S**etting up the interview
  - What information is key (labs, stage of disease, physical condition etc.)?
  - Where to meet for privacy?
  - Who needs to be present?
- **P**erception of the patient
  - What does he/she know?
  - What did "Dr. X" tell you?
- **I**nvitation to provide **K**nowledge (information)
- **E**motions – address with empathetic response
- **S**trategy and **S**ummary – options or next steps

Baile, W. F., et al., (2000). SPIKES - A Six-step Protocol for Delivering Bad News: Application to the Patient with Cancer, *The Oncologist, 5* (4). pp. 302-311. https://doi.org/10.1634/theoncologist.5-4-302

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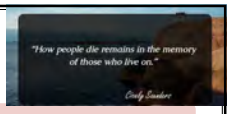
Comfort Measures



Emphasis is quality of life	
Loss of control with incontinence	Absorbent linens, frequent changing and/or diversion devices
Avoiding significant burdens e.g., transportation to RT center for palliative therapy unless used for symptom control (pain due to bone metastasis)	
Stopping interventions that may have been helpful in past but pose more risk e.g., transfusions	

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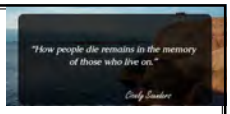
Pain Control



- Opioids are primary choice
- Dose according to comfort level
- Opioid toxicity
  - Accumulation of active morphine metabolites results in hyperalgesia, myoclonus, and profound sedation
    - Reduce dose or change to different opioid
    - Consider addition of local anesthesia, benzodiazepine, NSAID or steroid
- Terminal sedation
  - Use of benzodiazepines, barbiturates, and propofol to lower wakefulness or unconsciousness in severe cases

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Question

Anticholinergic medications may be indicated to treat

A. hormone-induced diuresis.
B. excessive secretions.
C. diaphoresis at end of life.
D. opioid toxicity at end of life.

223

Dyspnea
Interventions

- **Anticholinergics for secretion control**
  - glycopyrrolate
  - Atropine
  - Scopolamine
  - hyoscyamine
- **Upright position**
- Thorocentesis or home drainage system (PleurX®)
- Provide cool sensation to face – use of fan or cool compresses to cheeks
- **EBP - Oral or parental opioids – titrate to comfort**
- Benzodiazepines for anxiety related to dyspnea
- Diuretics for fluid overload
- RBC transfusions, only if effective i.e., adds to quality of life

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Medical Administration of Nutrition and Hydration (MANH)

- Unlikely to prolong life
- Enteral nutrition complications may include
  - Diarrhea
  - Increases risk of aspiration
  - Skin excoriation and/or Infection
  - Fluid overload
  - Need for restraint in confused patients
- Offer liquid supplements, sips of liquids or ice chips prn
- Cachexia and poor appetite likely due to disease burden

Elliot, K. & Patterson, K. H. (2024). Palliative and End-of-life Care. In Brant, J.M., et al. (Eds.), Core Curriculum for Oncology Nursing 7th ed.

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Delirium

Present in 25%-40% clients with cancer at some point during their journey

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Delirium
Types

- ***Hyperactive delirium*** – associated with medication side effects and sudden drug withdrawal
- ***Hypoactive delirium*** – occurs frequently in older adults and is associated with metabolic abnormalities and/or dehydration
- ***Mixed delirium*** – features of both hyperactive and hypoactive delirium

Fink, R. M., & Robinson , N. (2020). Palliative and End-of-life Care. In Brant, J.M., et al. (Eds.), Core Curriculum for Oncology Nursing, 6th ed.,pp. 28–41.

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Delirium

Assessment	**Management**
• Delirium Observation scale	• Treat reversible causes
• Caregiver effect	• Calm environment
• Safety	• Safety interventions

• Medication review	• Supportive medications
	  ◦ lorazepam (Ativan)
	  ◦ haloperidol (Haldol)

Fink, R. M., & Robinson , N. (2020). Palliative and End-of-life Care. In Brant, J.M., et al. (Eds.), Core Curriculum for Oncology Nursing, 6th ed., pp. 28–41.

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Grief and Bereavement - Theory

Part of the Human Experience

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Grief and Bereavement Definitions

- ***Loss*** – absence of a person or relationship
- ***Grief*** – psychological, social and somatic response to loss
- ***Mourning*** – outward and active expression of grief through rituals, social customs, and cultural practices
- ***Bereavement*** – timeframe for grief and mourning

Elliot, K. & Patterson, K. H. (2024). Palliative and End-of-life Care. In Brant, J.M., et al. (Eds.), Core Curriculum for Oncology Nursing 7th ed.

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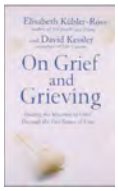
Kubler-Ross and Kessler
5 Stages of Grief



Denial	• "No, it can't be true."
Anger	• "Why me?"
Bargaining	• "Please, God."
Depression	• "I don't care anymore."
Acceptance	• "I can't change it, but here's what I can do."

Not a linear or sequential process

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Worden's Grief Task Model

- Grief work is viewed as a series of tasks to be completed
- Required for grief to be resolved

Four Tasks

1. **Accepting** reality of loss.
2. **Experiencing** pain of grief.
3. **Adjusting** to environment without the deceased.
4. **Relocation** – emotional withdrawal from the deceased, by forming memories, that allows one to continue in life.

- Basis of Comprehensive Hospice & Palliative Care programs

Fink, R. M., & Robinson , N. (2020). Palliative and End-of-life Care. In Brant, J.M., et al. (Eds.), Core Curriculum for Oncology Nursing 6th ed., pp. 28–41.

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Coping
Dual Process Theoretical Model

Dynamic nature of grief

Humans oscillate between loss-oriented & restoration-oriented coping

Both processes are necessary to adjust to loss

- **Loss-oriented coping**
  - Working through loss experience e.g., crying, yearning, relocation
- **Restoration-oriented coping**
  - Mastering new tasks, reorganizing life and developing a new identity

Stoebe, M. & Chut H. (1999). The Dual Process Model of Coping with Bereavement: Rationale and Description. *Death Studies, 23* (3), 197-224. https://doi.org/10.1080/074811899201046

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Image: https://whatsyourgrief.com/dual-process-model-of-grief/

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Manifestation of Acute Grief

Social

- Restlessness
- Social withdrawal
- Lack of ability to function

Physical

- Anorexia & weight loss or weight gain & overeating
- Palpitations, tension or panic
- Sleep disturbance
- Physical exhaustion

- **Cognitive-emotional**
  - Sadness
  - Crying
  - Forgetfulness
  - Anger or guilt
  - Mood swings
  - Helplessness
  - Yearnings for deceased
  - Dreaming of deceased

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Grief Interventions

- Acknowledge grief occurs before death
- Say things that need to be said
- Allow family to be with patient before and after death
  - Offer opportunity to participate in after death care
- Encourage family to talk about person who died
- Help people deal with sadness, anger, guilt & anxiety
- Reassure family that experiences are normal: loss of appetite, sleep changes, loss of concentration
- Recognize signs of complicated grief
- Referral to counseling services or resources

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Complicated Grief

- Disturbance in normal process of grief

1. **Prolonged Grief**
   - Persistent yearning beyond 6-12 months after loss causing significant mental distress and disability
2. **Sudden death or prolonged death**
   - Advanced cancer
   - Sudden hemorrhage
   - Blood and marrow transplant
   - COVID-19 death
3. **Disenfranchised Grief**
   - Loss that can't be openly acknowledged, socially validated, or publicly mourned e.g. extramarital fair, legally unrecognized union, loss of person before actual death e.g., dementia

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Question

The dual process model of coping with bereavement

A. assists families to resolve relationship conflicts before death of a loved one.
B. discusses restoration as the individual concentrates on working through some aspect of the loss.
C. provides a theoretical understanding of coping with grief and restoration.
D. focuses on the work of experiencing the pain of loss.

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Question

The oncology nurse can promote communication with caregivers by

A. avoiding repeating information.
B. encouraging them to tell their own stories about the situation.
C. encouraging them to avoid talking about their worries and fears.
D. suggesting they seek counseling.

239

Question

Which of the following interventions would be least helpful in the management of a patient experiencing delirium?

A. Elimination of extraneous loud sounds.
B. Reorienting and correcting misperceptions.
C. Administration of lorazepam.
D. Enabling the verbalization about relatives who have died.

240

Question

The oncology nurse assesses P.G. using the Palliative Performance Scale. This scale measures

A. activity level, pain, and nausea.
B. self-care, intake, and consciousness level.
C. hydration, orientation, and self-care.
D. ambulation, orientation, and pain.

241

Question

P.G. is experiencing severe pain and nausea that cannot be controlled adequately. The palliative care physician has ordered terminal sedation. Which of the following agents will the nurse anticipate administering?

A. Morphine
B. Fentanyl
C. Benzodiazepine
D. Antidepressant

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II. Oncology Nursing Practice - 17%

A. Scientific basis
1. Carcinogenesis
2. Immunology
3. Clinical trials (e.g., research protocols)
4. Molecular testing and genetics

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Cancer Basics
Introduction

- Cancers vary in
  - Growth rates
  - Differentiation
  - Detection
  - Invasiveness
  - Metastatic potential
  - Treatment response
  - Prognoses

- Once viewed as a single disease
- Today, cancer is viewed as 100-277 different diseases

Eggert, J. A. (2022). Genomics of Cancer. In Cancer Basics, pp. 3–27.

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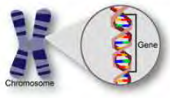
Carcinogenesis
Pathology



- At a cellular and molecular level, cancer is a ***dysregulation*** involving
  - Proliferation
  - Differentiation
  - Maturation
  - Apoptosis (programmed cell death)
- Results in cellular immortality
- Malignant growth is due to changes in cellular DNA due to
  - Variants in genes (inherited or acquired)
  - Change in chemical structure of DNA but does not change DNA coding sequence (epigenetic variant)

Eggert, J. A. (2022). Genomics of Cancer. In Cancer Basic, pp. 3–27.

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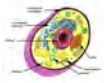
Cell Biology



Permanent Cells – Don't Divide
- Brain
- Heart
- Skeletal muscle
- Mature RBCs

Stable Cells – Spend most time in G_0 unless signaled
- Liver
- Renal (proximal tubules)
- Endocrine glands

Labile Cells - Rapidly Divide (short time spent in G_0)
- Skin
- GI lining
- Hair follicles
- Bone marrow

- *Labile cells pose highest risk of malignant transformation*

Eggert, J. A. (2022). Genomics of Cancer. In Cancer Basics, pp. 3–27.

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Molecular Biology
Cell Division

- Human body maintains predetermined number of cells
  Cell Growth=Cell Death
- Cell cycle controls how cells grow, proliferate and die
- Well controlled series of integrated events
- **Checkpoints** ensure cell is primed for duplication
- Cancer results from complex interplay of environment and susceptibility factors

Eggert, J. A. (2022). Genomics of Cancer. In Cancer Basics, pp. 3–27.

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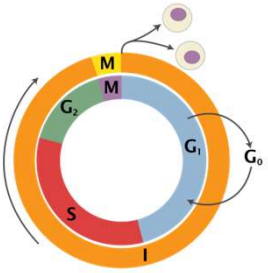
Cell Cycle Division

- G1: Transcription (mRNA) and translation (proteins) preparing for DNA replication (post-mitotic phase)
- S: Synthesis - DNA is replicating new sets of chromatids
- G2: Creation of proteins and organelles (pre-mitotic phase)
- M: Mitosis - chromosomes split into 2 cells
- G_0: Resting phase



Eggert, J. A. (2022). Genomics of Cancer. In Cancer Basics, pp. 3–27).

248

Question

Carcinoma in situ is defined as

A. abnormal cells extending to an adjacent organ.
B. highly differentiated hematopoietic cells.
C. poorly differentiated stromal stem cells.
D. transformed cells confined to the tissue of origin.

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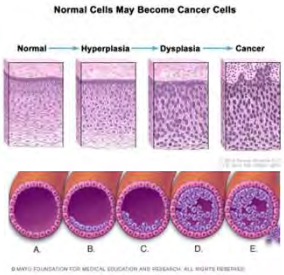
Pathology Reports

- Tumors grow and progress stepwise from healthy to very abnormal or undifferentiated
- ***Hyperplasia*** - Too much growth
- ***Dysplasia*** – abnormal tumor cells and tissue
- ***In situ*** – malignant cells have not left site of origin i.e. not invasive (Stage 0)
- ***Benign tissue*** – may be abnormal, obstruct adjacent tissue and/or transform to malignant tissue e.g. colon polyps



Ductal Breast Cancer
A - Normal duct
B - Hyperplasia
C - Atypical hyperplasia
D - Ductal carcinoma in situ (dysplasia)
E - Invasive ductal carcinoma

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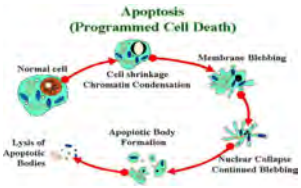
Apoptosis



- Defn. "Programmed cell death"
- All replicating cells are programmed for apoptosis
- Body's normal method to dispose of worn, unwanted, unneeded or damaged cells

Malignant cells evade apoptosis
i.e. malfunction

Eggert, J. A. (2022). Genomics of Cancer. In Cancer Basics, pp. 3–27.

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Question

Which type of cell is only capable of forming a new tumor?

A. Stromal stem cell
B. Cancer stem cell
C. Cancer passenger mutant
D. Hematopoietic stem cell

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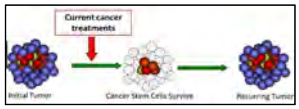
Models of Cancer Development
Cancer Stem Cell Theory

- Cancers demonstrate heterogeneity but only one cell type can form new tumor

Cancer stem cell (CSC)
- Drives tumorgenesis
- Only CSC can grow new tumor
- CSC capable of self-renewal (pluripotent)



- **CSC move into G_0 phase**
  - Resistant to treatment
  - May last months to years
  - Explains metastasis and relapse

Eggert, J. A. (2022). Genomics of Cancer. In Cancer Basics, pp. 3–27.

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Models of Cancer Development
Plasticity Model

- Non-cancer stem cells demonstrate ability to change throughout their life cycle and are converted to cancer stem cells

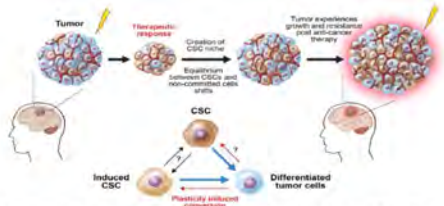

Figure 3: CSC, microenvironment and intratumoral equilibrium. When a tumor is exposed to hypoxia, low pH, chemotherapy or radiation, a microenvironment that favors CSCs is created. Because of this, some mature cells in the tumor dedifferentiate and stemness in the present CSCs is maintained. This plasticity of the tumor leads to drug resistance and disease reoccurrence.

Eggert, J. A. (2022). Genomics of Cancer. In Cancer Basics, pp. 3–27.

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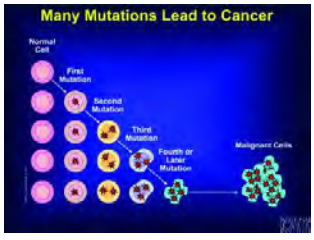
Models of Cancer Development
Clonal Model

- DNA changes result in a benign growth
- Cloned cells accumulate multiple genetic changes over time



Eggert, J. A. (2022). Genomics of Cancer. In Cancer Basics, pp. 3–27.

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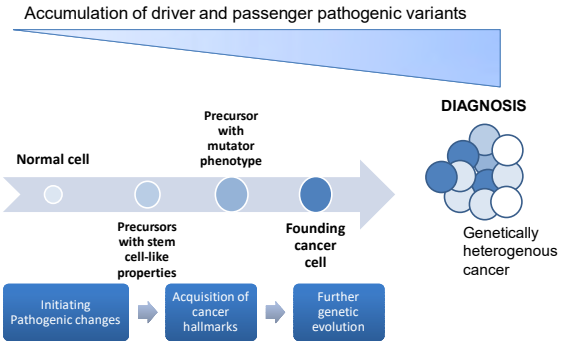
Carcinogenesis – 4 Phases



Seitz, M. C. (2024). Carcinogenesis. In Core Curriculum for Oncology Nursing, 7th ed., p. 61.

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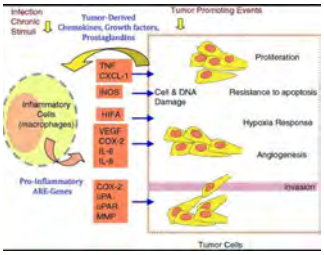
Models of Cancer Development
Inflammation Theory

- Inflammatory cells are primary cause of cancer, proliferation, survival & migration of cancer cells
- Immune mediators and receptors encourage invasion, migration, and metastasis
- Chronic inflammatory conditions associated with carcinogenesis
  - Bronchitis, pancreatitis, cystitis, Barrett esophagus, liver cirrhosis & Crohn disease

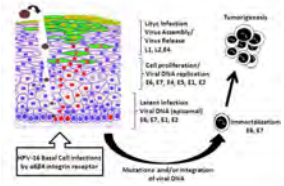


Seitz, M. C. (2024). Carcinogenesis. In Core Curriculum for Oncology Nursing, 7th ed.,

257

Models of Cancer Development
Viral Infections

- DNA virus (HPV, EBV, HBV) or RNA virus (HCV, HIV, HTLV-1) is integrated into human genome
- Transcribed by host RNA polymerase
- Causes mRNA to be translated into a non-functioning protein resulting in cell proliferation



Seitz, M. C. (2024). Carcinogenesis. In Core Curriculum for Oncology Nursing, 7th ed.,

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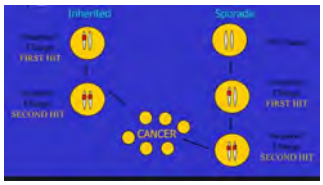
Models of Cancer Development
Knudson's "Two Hit" Theory (Stochastic Model)

- Chromosomes have 2 identical genes to control growth
- If initial gene on one chromosome is damaged, second gene can still function as normal
- When gene on second chromosome is also damaged then malignant transformation occurs
  - **Inherited variant** (Germline) require only one hit
    - BRCA-1 & BRCA-2
  - **Acquired variant** (Somatic) require two hits



Each cancer cell has ability to multiply & form new tumors

Eggert, J. A. (2020). Genetic Risk Factors. In Core Curriculum for Oncology Nursing, pp. 72–84.

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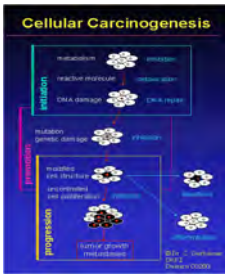
Models of Cancer Development
Cellular Carcinogenesis-Oncogenesis Theory

Phases

1. **Initiation:** DNA damage from chemicals, radiation and/or viruses may result in:
   - repair & prevent initiation
   - permanent variant but not cancer until exposed to a cancer promoter
   - Variant and a cancer cell line production
2. **Promotion – "Gas Pedal" or "Brakes"**
   - Alters genetic structure or inhibit apoptosis
   - Influenced by time/dose exposure to promoters of cancer, age, immune system and inhibitors
   - Cancer can grow from this point
3. **Progression**
   Increased genetic instability (variants)
   - Invasion
   - Neovascularization
   - Metastasis



Seitz, M. C. (2024). Carcinogenesis. In Core Curriculum for Oncology Nursing, 7th ed.

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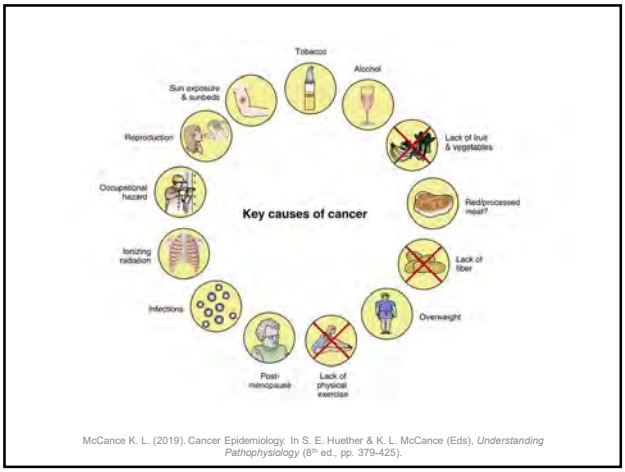

McCance K. L. (2019). Cancer Epidemiology. In S. E. Huether & K. L. McCance (Eds), *Understanding Pathophysiology* (8th ed., pp. 379-425).

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Carcinogenic Initiators/Promoters
Radiation

Ionizing Radiation
- Diagnostic/Therapeutic
  - X-Rays
  - CT scans
  - Radiation Therapy

Man-made Isotopes
- I-131

Non-ionizing Radiation
- Ultraviolet radiation
- Sunlight
- Tanning beds
- Germicidal Lamps
  - Laboratory (UVC rays)

Environmental Sources
- Radon and uranium
- Nuclear energy plants
- Atomic bombs

Seitz, M. C. (2024). Carcinogenesis. In Core Curriculum for Oncology Nursing, 7th ed.

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Carcinogenic Initiators & Promoters
Chemicals

- Tobacco smoke
- Arsenic
- Coal tar
- Nickel compounds
- Mustard gas
- Asbestos
- Alcohol
- Cadmium
- Antineoplastic agents
  - Alklyating agent
  - Topoisomerase inhibitors
- Cyclosporine

Seitz, M. C. (2024). Carcinogenesis. In Core Curriculum for Oncology Nursing, 7th ed.

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Carcinogen Initiators/Promoters	Associated Cancers
Viruses	
Human Papilloma Virus (HPV)	Cervix, Vulva, Vagina, Anal Canal, Head & Neck, Pharyngeal & Penile
HPV-16, -18, -31,-33, -35,-39, -45,-58, -82	
Epstein Barr (EBV)	Burkitt Lymphoma & Nasopharyngeal
Human T-Lymphotropic Virus (HTLV-1)	T-Cell Leukemia/Lymphoma (ATLL)
Human Immunodeficiency Virus (HIV)	NHL, Cervical, Anal, Lung, Liver, Kaposi Sarcoma, Hodgkin
Hepatitis B & C	Hepatocellular cancer
Infectious Agent (Non-viral)	
Liver flukes	Cholangiocarcinoma
Schistosomiasis	Bladder, liver, rectal, follicular lymphoma spleen
Chronic bacterial cholecystitis	Gallbladder cancer
Industrial	
Benzene exposure	Leukemia/lymphomas
Soot & cold tar	Lung & Skin
Vinyl chloride	Hepatocellular
Air Pollution	Lung
Drug Exposure	
Diethylstilbestrol (DES)	Uterine Vagina Breast in female offspring
Estrogen	Breast and Uterine

Seitz, M. C. (2024). Carcinogenesis. In Core Curriculum for Oncology Nursing, 7th ed.

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Other Promoters

- **Age**
  - Very young & elderly
- **Diet**
  - High salt
  - Processed foods
- **Stress**
- **Body System Diseases**
  - Immune system
  - Pancreas
  - Liver
  - Colon
- **Time and/or Dose Exposure Limits**
  - Radiation
  - Chemotherapy

Seitz, M. C. (2024). Carcinogenesis. In Core Curriculum for Oncology Nursing, 7th ed.

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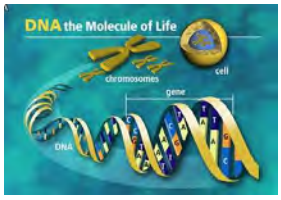
DNA Structure



NIH Genetic Home Reference Primer

https://ghr.nlm.nih.gov/primer

- Nucleated cells contain genetic information within millions of genes
- ≈ 25,000 genes code for protein & cell reproduction
- DNA: Double helix structure in nucleus
- **Each cell contains:**
- 46 chromosomes (CHR)
  - 23 pairs
  - One set inherited from each parent
- 23 CHR pairs represent autosomes
  - numbered 1-22
  - 1 pair sex CHR
    - Female XX
    - Male XY

Seitz, M. C. (2024). Carcinogenesis. In Core Curriculum for Oncology Nursing, 7th ed.

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Question

The small arm of the chromosome is labeled as

A. y.
B. q.
C. x.
D. p.

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Chromosome Structure

Chromatid Arms:
- Small arm "p" (petite)
- Large arm "q" (follows "p")

Telomeres:
- Protective end caps

Centromeres:
- Join sister chromatids

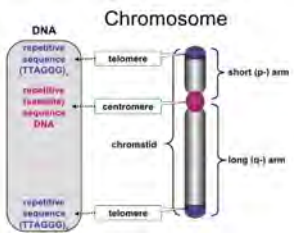

Image:

Eggert, J. A. (2020). Genetic Risk Factors. In *Core Curriculum for Oncology Nursing* (pp. 72–84). Elsevier.

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The CFTR gene is located on the long arm of chromosome 7 at position 7q31.2.

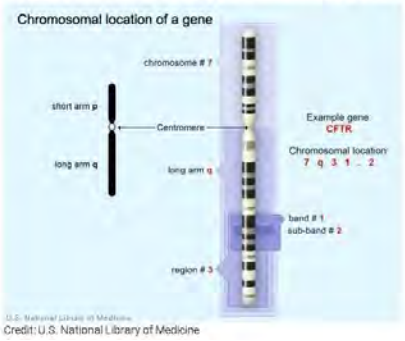

Image: https://ghr.nlm.nih.gov/primer

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DNA Terminology

3 billion DNA subunits in base pairs (A-T & C-G)

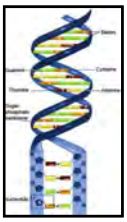
Purines
- Adenine - A
- Guanine - G

Pyrimidines
- Thymine - T
- Cytosine - C

Transcription
- Making RNA from DNA
- Uracil replaces thymine in mRNA

mRNA Codons
- Sequence of 3 nucleotides in DNA or mRNA molecule
- Codons code for 1 of 20 amino acids

Translation
- Making a protein chain from codons



Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing* 7th ed.

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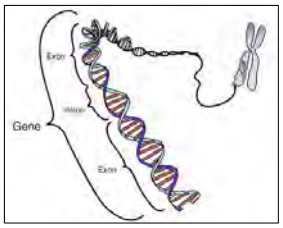
Genes



- Genes are the basic structural and functional units of heredity
- Genes determine our characteristics such as height, eye color, blood type etc.
- Individual units located on specific positions on a chromosome
- Consist of a sequence of DNA that codes for a specific protein
- Consist of exons & introns
- **Exons**
  - Protein-coding segment
  - **Altered due to carcinogenesis (somatic changes)**
- **Epigenetics**
  - Additions or removal of chemical groups (tags) alter transcription and translation
- **Introns**
  - Non-protein coding segments or sequence-interrupting piece of a gene

Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*

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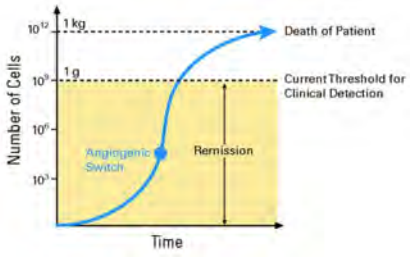
Tumorigenesis

Gompertzian Growth Curve

- 30 doubling times
- Size of marble (1 cm) = 1 billion cells
  - Earliest point of clinical detection



Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*

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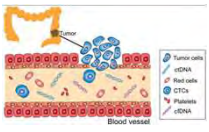
Genetic Risk Factors

Pathogenic Variants and Heredity

- All cancers are genetic variants
- Not all cancers are inherited variants



- **Acquired (Somatic) Variant** (90-95%)
  - Single cell variant during a lifetime
  - accumulation of a series of genetic variants
  - Affects mature population greater than age 50
- **Inherited (Germline) Variant** (5-10%)
  - Inherited in germline **(gamete)** reproductive cells
  - Affects younger population less than age 45

Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*

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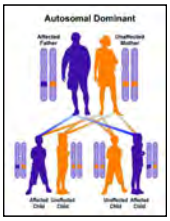
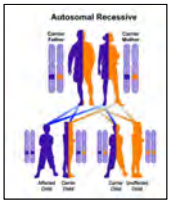
Mendelian Inheritance

Inherited (Germline Variant) Cancer Gene



- **Autosomal Dominant**
  - 1 copy of altered gene required
  - 50% (1:2) offspring inherit a variant
  - Most cancer syndromes are dominant
    - Retinoblastoma (Rb) gene



- **Autosomal Recessive**
  - 2 copies of gene required (1 from each parent)
  - 25% (1:4) offspring inherit a variant

Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*

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Regulatory Genes

Tumor Suppressor Genes **(Germline Variants)**

Common Defective TS Genes "Brakes Off"	Cancer
BRCA-1 and BRCA-2	Female– breast (90%), ovarian (60%), fallopian, endometrial Male–breast, prostate (35%) pancreatic, peritoneal, melanoma
CHEK2	Female – breast (30-50%), ovarian Male –- breast, prostate colon, thyroid
APC (familial adenomatous polyposis)	Colorectal cancer (93%), gastric, duodenal, thyroid, pancreatic, brain, liver, GI polyps (100's to 1000s)
Tp53 Li-Fraumeni Syndrome	Breast cancer, sarcoma, leukemia, brain tumors, adrenocortical carcinoma & other cancers Overall risk for malignancy is 95% in females and 88% in males
Cowden Syndrome PTEN MUTYH Polyposis	Breast(50%), thyroid (35%), endometrial (10%), duodenal, colon, gastric, melanoma, kidney, prostate, and GI polyps
RB1	Retinoblastoma, osteosarcoma, melanoma, soft tissue sarcoma

Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*

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Regulatory Genes

Mismatch Repair Gene **(Germline Variant)**

- Defective regulation results in an increased rate of genetic variants compared with normal cells
- Genetic makeup of cancer cells is less stable than normal cells
- Microsatellite instability (MSI) are series of tandem repeated nucleotides with variable lengths
  - 30% of variants (mutations) in microsatellites is defined as high (MSI-h)

Variant (Mutation)	Cancer
MSH2, MLH1, MSH6, PMS2, EPCAM **Lynch Syndrome** (HNPCC – hereditary non-polyposis colorectal cancer)	Colorectal Endometrial Ovarian Renal pelvis Pancreatic Gastric CNS Female breast Small bowel Brain Urothelium Biliary tract

Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*

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Regulatory Genes (Somatic Variants)

"Gas Pedal" – Stuck Down to the Floor

Proto-oncogenes

- Functional genes involved in normal growth and repair
  e.g. after surgery repairs tissue
- **Tumor genomic variant** leads to oncogene development (cancer)

Oncogenes	Associated Cancer
K-ras	Colorectal and Pancreatic
Myc	Lung, Breast and Burkitt Lymphoma
EGFR	Squamous cell cancers & Melanoma
ERB-b2 (HER2)	Breast, Ovarian, Lung and Gastric
MET Microsatellite instability	Hereditary Papillary Renal cell – bilateral Liver Head & Neck
Bcr-abl	CML and ALL

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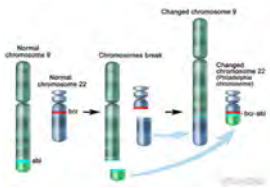
Chromosomal Abnormalities

Translocations



- Exchange of material between chromosomes
  - Philadelphia chromosome t(9:22) bcr-abl
    - Diagnostic marker for CML
    - Bcr-abl gene results in over-production of a protein called tyrosine kinase
    - Targeted therapy – TKI inhibitors
      - Imatinib
      - Bosutinib
      - Dasatinib
      - Nilotinib
      - Ponatinib
  - MYC proto-oncogene Chr 8 relocated to Chr 14 t(8:14)
    - Diagnostic marker of Burkitt Lymphoma

Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*

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Types of Genetic Variants

- ***Point or Missense Variant*** – only 1 nucleotide base altered
- ***Nonsense Variant*** - premature termination of a protein
- ***Frameshift Variant*** – one or more bases added or deleted from a sequence

Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*

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Cancer	Next-Generation Sequencing (NGS) Panels
Breast Ovarian Prostate Pancreatic Colorectal High-penetrance susceptibility genes Pathogenic variants (tests done through blood sample)	PTEN, ATNM, BARD1, BRIPI, CDH1, CHEK2, Cowden Syndrome, NBN, PALB2, PMS2, PTEN, RAD51C, RAD51D, STK11, TP53, XRCC2 MSH2, MLH1, MSH6, PMS2, EPCAM EPCAM, FANCC. Lynch Syndrome
Acute Myelogenous Leukemia Molecular genetic testing (done on leukemic cells or bone marrow aspirate cells)	KIT, FLT3 (IDT and TKD), NPM1, CEBPA, IDH1, IDH2 TP53 • ***Actionable variants:*** - FLT3 – midostaurin (Rydapt)and gilteritnib (Xospata) - IDH1 – ivosidenib (Tibsovo)

Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*
NCCN Clinical Practice Guidelines Acute Myeloid Leukemia . (2023, January 13). National Comprehensive Cancer Network.

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Hallmarks of Cancer

- **Self-sufficiency in growth signals & receptors**
  - Growth factors (ligands)
    - Epithelial GF/Transforming GF /Colony Stimulating GF/Platelet-derived GF
  - Chemical signals promote transformation
- **Tyrosine kinase activity**
  - Stimulates mitotic cell division
- **Insensitivity to antigrowth signals**
- **Sustained angiogenesis**
- **Tissue invasion**
- **Metastasis**
- **Evasion of apoptosis**
  - Limitless replication potential
  - Cancer stem cells contain high amounts of *telomerase* which prevents telomere shortening and cell death

Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*

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Hallmarks of Cancer

- Genomic instability
- Reprograming of energy metabolism
- Evasion of immune response
- Mutations plus tumor-promoting inflammation

Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*

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Question

Cancer development is known as

A. mutagenesis.
B. teratogenesis.
C. carcinogenesis.
D. immune surveillance.

283

Question

K-ras is an example of a

A. tumor suppressor gene variant.
B. proto-oncogene variant.
C. DNA repair gene variant.
D. chromosome translocation.

285

Question

A germline variant occurs in

A. all cells of the human body.
B. the first generation of offspring only.
C. carcinogenesis.
D. gamete cells only.

284

Question

J.P. is considering having children and carries the BRCA-1 gene. What is the probability of an offspring inheriting the gene?

A. 25%
B. 100%
C. 75%
D. 50%

286

Question

Cancers can arise from which pathophysiologic process?

A. Apoptosis
B. Genomic instability
C. Contact inhibition
D. DNA repair genes

287

Question

Which virus is associated with nasopharyngeal cancer?

A. Hepatitis B virus (HBV)
B. Epstein Barr virus (EBV)
C. Human T-cell lymphotrophic virus-1 (HTLV-1)
D. Herpes simplex virus (HSV)

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Hereditary Genetic and Tumor Genomic Testing
Implications for Practice

- Identify high-risk individuals
- Chemoprevention
- Early detection
- Prognosis
- Classification of cancers
- Selection of therapy
- Monitor response to therapy
- New targets for therapy
- Promote healthy behaviors

Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*

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Hereditary Genetic Testing Criteria

- Confirmed family history consistent with a hereditary cancer syndrome
- Tests must have clinical utility
  - used to assist in medical decision making or diagnosis
  - Insurance preauthorization required for each test or panel
- Informed consent required
  - risks and benefits
- Pre- and post-test genetic counseling provided

Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*

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Hereditary Genetic Testing Criteria
NCCN Guidelines 2024

- Breast cancer at any stage diagnosed ≤ 45 y
- Triple-negative breast cancer diagnosed at age 60 or younger
- Male breast cancer
- Ashkenazi Jewish, at any age, with breast or prostate cancer
- One or more close relatives with breast, ovarian, pancreatic or prostate cancer age 50 or younger
- Ovarian cancer at any age or stage
- Pancreatic cancer
- Metastatic prostate cancer at any age

NCCN Clinical Practice Guidelines, Genetic Familiar High-risk Assessment: Breast, Ovarian, and Pancreatic (v.2, 2024). https://www.nccn.org/professionals/physician_gls/pdf/genetics_bop.pdf

291

Question

For genetic testing of cancer, pedigree documentation by a genetic counselor requires

A. three generations of a maternal lineage.
B. two generations of both lineages.
C. four generations of a paternal lineage.
D. three generations of both lineages.

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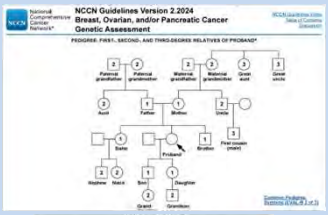
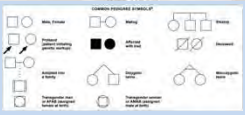
Pedigree Documentation



- **3 generations for both lineages**
- Proband – patient initiating testing
- Circles designate females and squares are males
- Relatives with cancer or pre-malignant conditions
- Age of relative diagnosed with cancer and history of treatment, preventative therapy, or surgery



* First-degree relatives: parents, siblings, and children;
second-degree relatives: grandparents, aunts, uncles, nieces, nephews, grandchildren, and half-siblings;
third-degree relatives: great-grandparents, great-aunts, great-uncles, great-grandchildren, first cousins, and half aunts and uncles.

NCCN Clinical Practice Guidelines, Genetic Familiar High-risk Assessment: Breast, Ovarian, and Pancreatic (2023, January 10). National Comprehensive Cancer Network.

293

Legal Issues
Federal Laws

- **HIPPA**
  - Prohibits insurance discrimination or pre-existing condition
- **Genetic Information Nondiscrimination Act (GINA)**
  - Prohibits employment and health insurance discrimination
    - **Does not prevent discrimination against life, disability and long-term care insurance**
    - **Does not apply to Native Americans, active military and veterans**
- **US Equal Employment Opportunity Commission**
  Americans with Disabilities Act (ADA)
  - Prohibits discrimination based on genetic information

Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*

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Genetic Predisposition Testing
Post-Test Counseling

True-positive (Pathogenic or Likely Pathogenic)
- Carrier of known cancer predisposing gene
- Aggressive screening and prevention measures are recommended

True-negative (Benign or Likely Benign)
- Not a carrier
- Client is within general population risk of cancer
- Follow ACS guidelines for cancer prevention

Variant Result
- Indeterminate significance - uninformative
  - Not a carrier and family members are not carriers or it's unknown
    - ✓ test other family members or participate in hereditary cancer registry or study
  - Likely benign
  - Likely pathogenic: make decisions regarding prevention and early detection
- Inconclusive - variants of unknown significance
  - Carrier of a gene that currently has no known significance

Mahon, S. M. (2022). Cancer Risk and Prevention . In Cancer Basics; NCCN Clinical Practice Guidelines, Genetic Familiar High-risk Assessment: Breast, Ovarian, and Pancreatic (2023, January 10). National Comprehensive Cancer Network.

295

Tumor Genomic Testing
Biomarker Paradigm Shift

- Testing for markers on tumor tissue or peripheral blood (liquid biopsy)
- Aids in diagnosis, prognosis and treatment decisions i.e. precision medicine
- ONS Genomics Advisory Board resources for nurses
  - Genomics and Precision Medicine Learning Library
    - ons.org/learning-libraries/precision-oncology
  - Genomics Glossary
    - ons.org/genomics-taxonomy
  - Webinar: Genomic Testing in Cancer Care
    - ons.org/webinars/genomic-testing-cancer-care-recorded-webinar
  - Oncology Nursing Podcast Episode 39
    - Understanding Genomics in Oncology Nursing ons.org/podcasts/episode-29-understanding-genomics-oncology-nursing

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Tumor Genomic Testing
Biomarker Paradigm Shift

- ONS Biomarker Database
  - https://www.ons.org/clinical-tools/biomarkers
- ASCO Genetics Toolkit
  - https://www.asco.org/news-initiatives/current-initiatives/cancer-care-initiatives/genetics-toolkit
- City of Hope's Intensive Course in Genomic Cancer Risk Assessment
- Jackson Laboratory for Genomic Medicine
  - https://www.jax.org/personalized-medicine
- NCI PDQ cancer information summaries on genetics
  - Cancer.gov/publications/pdq/information-summaries/genetics
- National Society of Genetic Counselors
  - nsgc.org

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Tumor Genomic Testing
Techniques

- **Large genomic rearrangements (LGR)**
  - Serial analysis of gene expression (SAGE)
    - OncotypeDX & 18-gene ColoPrint - colon cancer
    - 21-gene (OncotypeDX), 70-gene signature (Mammaprint) - breast cancer
    - 46-Gene signature (Prolaris), 17-gene signature (Oncotype DX) – prostate cancer
    - 70-gene signature MyPRS – Myeloma Prognostic Risk Signature
- **Next-generation DNA sequencing (NGS)**
  - Higher-efficiency technique
  - Detects small or somatic alterations
    - Capable of detecting millions of DNA variants at once
  - Target whole genome
    - Expensive and too much information for clinical use
  - NGS-based panel tests are used in daily practice to detect actionable driver gene mutations/variants
    - Precision medicine to personalize disease management
    - New lower cost

Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*

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Tumor-agnostic Markers and Treatment

- Microsatellite instability-high (MSI-H) testing to treat cancer with immunotherapy regardless of the primary site
  - Pembrolizumab (Keytruda), nivolumab (Opdivo), and ipilimumab (Yervoy)
- Molecular profiling to help guide treatment decisions (diagnostic value)
  - Liquid Biopsy (Proteomics) – peripheral blood
  - Circulating tumor DNA (ctDNA) cells
    - Guardant360®
    - FoundationOne Liquid™
    - PGDx elio™
  - Cell-free DNA (cfDNA)
    - nucleic acid fragments from tumor cells during apoptosis or necrosis

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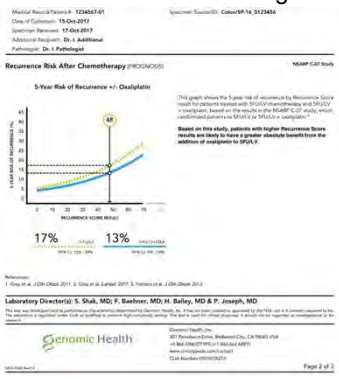
Tumor Biomarker Testing



- Predictive medicine – disease recurrence risk +/- oxaliplatin

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Tumor Biomarker Testing

- Precision medicine and/or access to clinical trials

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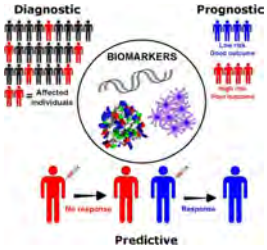
Tumor Biomarkers
Pathologic Testing



- Estrogen receptor
- Progesterone receptor
- Human epithelial growth factor (EGFR) receptors
- Fluorescent in situ hybridization (FISH)
- Flow cytometry
- Immunophenotyping – antigen expression
- Cytogenetics – genetic markers

Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*

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Case Study

Mia is a 30-year-old woman with breast cancer. She is wondering why her oncologist is recommending genetic screening since she needs to undergo treatment anyway. Mia's history reveals she is Jewish and her mother, grandmother, and aunt died of ovarian cancer.

1. What indicators for genetic screening apply to Mia?

2. Which genetic tests could be applicable?

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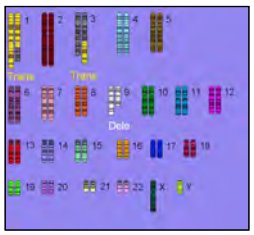
Genetic Markers
Cytogenetics



- Structure, function & abnormalities of chromosomes
- Used commonly in solid & hematologic malignancies
- Karyotype provides view of number & structure of chromosome analyzed
- Identify rearrangements, deletions or gains
- Personalized approach to cancer to diagnose, predict outcomes or suggest best treatment regimen

Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*

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Cytogenetic Nomenclature Report

- # of chromosomes
- Sex chromosome (XX-female or XY-male)
- Abnormality abbreviation
  - Translocation (t)
  - Deletion (del)
  - Duplicate (dup)
  - Insertion (ins)
  - Inversion (inv)
  - Trisomy (tri)
- First chromosome separated with semicolon from second chromosome
- Arm (p or q) and band number affected

<u>Myeloma examples</u>:

1. 46, XY, t(14;16) (q32;q23)
2. 46, XX, t(14;20) (q32;q12)
3. 46 XY del (17p)

Akopyan, A., et al., (2024). Genetics and Cancer. In *Core Curriculum for Oncology Nursing 7th ed.*

305

Question

Pharmacogenomics assists in

A. identifying the chemotherapy.
B. selecting a targeted therapy.
C. escalating the dose of agents.
D. decreasing the dose of agents.

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Precision Medicine
Application

1. **Cancer risk assessment genetic tests**
   - Breast Cancer and BRCA1 and/or BRCA2
   - Lynch Syndrome: MSH2 and/or MLH1
   - Colorectal Cancer and APC
2. **Cancer prediction tool** to aid in diagnosis, treatment or prognosis
   - Breast cancer: Gail Model
   - Melanoma Risk Assessment
   - Prostate cancer: Partin Tables
   - Colorectal cancer nomograms
   - Cancer of the Lung Evaluation and Assessment of Risk (CLEAR)

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Precision Medicine
Application

3. **Diagnosing disease**
   - Whole genome sequencing or NGS
4. **Determining prognosis**
   - Genetic and biomarker testing
   - Clinical decision support tool to integrate patient data and clinical variables
     - Tumor, performance status and age (frailty)
     - American Society of Clinical Oncology Clinical Practice Guidelines (biomarkers)

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Pharmacogenomic Testing – Precision Medicine
Required Prior to Treatment

Actionable Variants	Cancer Type	Targeted Therapy
ALK	NSLC Lymphoma (large cell) Neuroblastoma	Alectinib Brigatinib Crizotinib Ceritinib
BCL-2	CLL	Venetoclax
BCR-ABL translocation	CML B-cell ALL	Imatinib Dasatinib Bosutinib Nilotinib Ponatinib Bafetinib
BRAF	Melanoma Ovarian Thyroid	Vemurafenib Cobimetinib Dabrafenib Trametinib
EGFR	NSCLC Colon	imatinib gefitinib afatinib osimertinib

Cheek, D. J. (2022). Pharmacogenomics. In Cancer Basics (pp. 65–76). Oncology Nursing Society.

309

Pharmacogenomic Testing
Required Biomarker Prior to Prescribing Treatment

Actionable Variant	Cancer Type	Targeted Therapy
FLT3	AML	Midostaurin Sorafenib Sunitinib
Histone deacetylase	Lymphoma – T-cell cutaneous	Panobinostat Romidepsin
(Wild-type) non-mutated KRAS	Colon Lung Pancreatic	Cetuximab Panitumumab
Human epithelial growth factor receptor 2 HER2	Breast Brain Lung Ovarian Stomach	Trastuzumab Pertuzumab Lapatinib Neratinib
mTOR	Astrocytoma Breast Pancreatic Renal	Everolimus Ridaforolimus Temsirolimus

Cheek, D. J. (2022). Pharmacogenomics. In Cancer Basics.

310

Pharmacogenomic Testing
Required Biomarker Testing Prior to Treatment

Actionable Variant	Cancer Type	Targeted Therapy
MET	NSCLC Medullary thyroid	Cabozantinib Crizotinib
PARP	BRCA mutations (germline or somatic) Fallopian tube Ovarian(epithelial) Peritoneal	Niraparib Olaparib Rucaparib
PIK3CA	Her2 metastatic breast cancer	Alpelisib
PDL-1	Head & Neck squamous cell Hodgkin lymphoma Merkel cell carcinoma Urothelial carcinoma Bladder Renal Liver Microsatellite instability-high cancers	Atezolizumab Avelumab Durvalumab Nivolumab Pembrolizumab
PDGFRα (platelet-derived growth factor receptor alpha)	Gastrointestinal stromal tumor (GIST)	Imatinib

Cheek, D. J. (2022). Pharmacogenomics. In Cancer Basics..

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Pharmacokinetic Gene Variant Testing
Recommended for Treatment Decisions

Genomic Enzyme Variant	Cancer Target	Oncologic Agent
TPMT	Acute Lymphoblastic Leukemia	Mercaptopurine Thioguanine (enhanced toxicities)
UGT1A1 UGT1A1*28 alleles carry lower enzyme expression and activity	Colorectal cancer CML (Japanese population)	Irinotecan (elevated risk neutropenia) Nilotinib (↑ bilirubin)
CYP2D6	Breast cancer	Decreased sensitivity to tamoxifen dosing if CYP2D6 activity is poor Higher risk for relapse

Cheek, D. J. (2022). Pharmacogenomics. In Cancer Basics.

312

Question

The primary benefit of targeted drug therapy is

A. oral route of drug administration for all agents.
B. sparing of normal cells.
C. dose escalation that improves outcomes.
D. predictability of adverse effects compared to cytotoxic agents.

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CANCER	COMMON SITES OF METASTASIS
Bladder Thyroid	Bone, liver, lung
Breast	Bone, brain, liver, lung
Colon	Liver, lung, peritoneum
Lung Renal	Adrenal gland, bone, brain, liver, lung
Melanoma	Bone, brain, liver, lung, skin, muscle
Ovary Pancreas Rectal Stomach	Liver, lung, peritoneum
Prostate	Adrenal gland, bone, liver, lung
Uterus	Bone, liver, lung, peritoneum, vagina

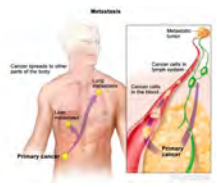

Image: https://www.cancer.gov/types/metastatic-cancer

Seitz, M. C. (2024). Carcinogenesis. In Core Curriculum for Oncology Nursing, 7th ed.

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Tumor Markers
Antigen-associated Cancer

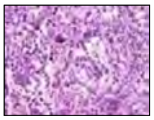
Oncofetal antigens
- **Carcinoembroyonic antigen (CEA)**
  - Colorectal
  - Breast
  - Lung
  - Liver
  - Pancreatic
  - Gyne & testicular cancers
- **Alpha-fetoprotein (AFP)**
  - Testicular
  - Hepatocellular
  - Lung
  - Pancreatic
  - Ovarian
- **Viral antigens (HTLV-1)**
- **Placental antigens**
  - Human chorionic antigen (β-HCG)
    - Gyne & testicular
  - Human placental lactogen (HPL)
    - Gyne
- **Prostate-specific antigen (PSA)**
  - Prostate
- **Differentiation antigens**
  - Leukemia (CD 33)
  - Lymphoma (CD 20)
- **Lineage-associated antigens**
  - CA-125 – Ovarian
  - Ca 19-9 Pancreatic and gastric

Anderson, M. K. (2022). Cancer Diagnosis and Staging. In Cancer Basics.

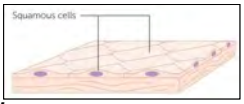
314

Epithelial Carcinoma

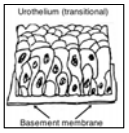
- ***Adeno- line glands or ducts***
  e.g. Pancreatic adenocarcinoma



- ***Squamous – epithelial***
  e.g. Squamous cell lung cancer



- ***Transitional - urinary tract epithelium***
  - ***Epithelial tissue lining hollow organs***
    e.g. Urothelial carcinoma (bladder cancer)



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Metastastic Pathways

- Direct invasion
- Spread - venous or lymph system
  - Entrapment in first node
  - "skip metastasis" distant sites
- Seeding thru body cavity i.e. peritoneum
- Embolism & Implantation
- "Cross Talk" – cytokine messengers between cancer cells and distant host cells
  - Skeletal - Osteolytic (bone destructing)
  - Osteoblastic (bone forming)
- Arterial & venous spread to first capillary bed
  - Liver or lungs most common
- Tumor angiogenesis
  - VEGF promotes growth

Seitz, M. C. (2024). Carcinogenesis. In Core Curriculum for Oncology Nursing, 7th ed.

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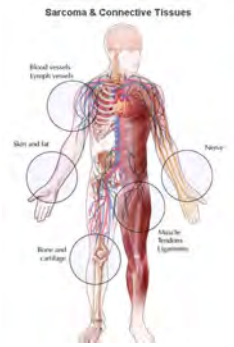
Sarcomas

- Originate in connective tissue
- Prefix designates type of tissue:
  - *Osteo* – bone
  - *Chondro* – cartilage
  - *Lipo* – fat
  - *Leiomyo* – smooth muscle
  - *Rabdomyo* – striated muscle



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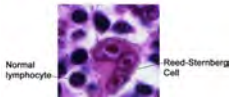
Hematologic Malignancy

- **Leukemias** – cell type and maturity
  - *Myelo* – myeloid origin (WBC, RBC & platelets)
  - *Lympho* – lymphoid origin (T-cells & B-cells)
- **Lymphoma**
  - Hodgkin (Reed Sternberg marker)
  - Non-Hodgkin (NHL)



- **Multiple Myeloma** – plasma cell line (B-cell origin)

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Question

The oncology nurse knows that the tumor, node, metastasis (TNM) cancer staging system is intended to

A. predict the growth fraction of a tumor.
B. evaluate extent of disease.
C. determine the degree of differentiation of cells.
D. be a staging system for all cancer types.

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Cancer Staging

Types	Staging Window
Clinical (pre-treatment)	based on physical exam, imaging, and biopsy
Pathologic (post-surgical)	based on tissue (histology and grade), and/or fluids (cytology), tumor size, invasiveness into other tissues and organs
Post-therapy/postneoadjuvant therapy	to confirm cancer status after systemic therapy, hormone therapy, RT prior to surgery or when no surgery is done restaging
Restaging or retreatment	used for determining the extent of recurrence
Autopsy	

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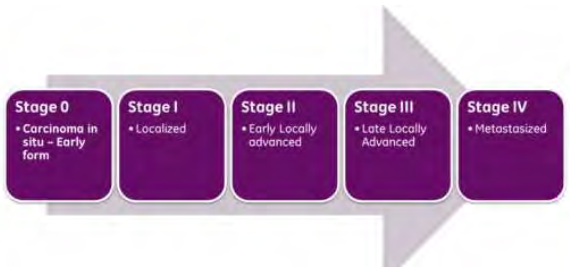
Cancer Staging System

American Joint Committee in Cancer *AJCC* (8th Ed.)



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Cancer Staging

Purpose

- Select treatment options
  - Type of surgery and other cancer therapy before, during, or after surgery
  - Quality care requires staging be documented prior to treatment
- Provide prognostic information i.e. cure, control, or palliate
- Provide clear communication with other providers
- Evaluate result of therapy provided
- Identify potential clinical trials
- Contribute to ongoing research
- Facilitate valid comparison of results of different treatment regimens at cancer centers and international level

Anderson, M. K. (2022). Cancer Diagnosis and Staging. In Cancer Basics (pp. 57–63). Oncology Nursing Society.

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Staging System	Cancer
Scarff-Bloom-Richardson System Grading Point System (Tubule formation, nuclear pleomorphism, mitotic count) 1-3 points per category	Breast
International Prognostic Index (IPI)	Chronic lymphocytic leukemia
Lugano	Lymphoma
FAB and WHO Classification	Leukemia
International Staging System	Myeloma
International Federation Gynecology & Obstetrics (FIGO)	Gynecologic cancers

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AJCC Tumor Grading System

- Describes the tumor's appearance/ maturity:
  Grade X – grade cannot be assessed
  Grade I - well differentiated (mature) – low grade
  Grade 2 - moderately differentiated – intermediate grade
  Grade 3 - poorly differentiated – high grade
  Grade 4 – undifferentiated (primitive) – high grade
- May indicate tumor responsiveness to therapy

Anderson, M. K. (2022). Cancer Diagnosis and Staging. In *Cancer Basics* (pp. 57–63). Oncology Nursing Society.

325

Performance Status

- Numerical assessment of patient's level of self-care
  - ADL
  - Includes mobility
- Factor in determining treatment plan
- Prognostic indicator
- ECOG/WHO/Zubrod scale
  - 0 to 5
- Karnofsky scale
  - 100 to 0%

Anderson, M. K. (2022). Cancer Diagnosis and Staging. In *Cancer Basics* (pp. 57–63). Oncology Nursing Society.

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Performance Status
ECOG/WHO/Zubrod Scale

0 – Fully active

1 – Ambulatory but restricted in strenuous activity; office work or light housework

2 – Ambulatory and capable of self-care but unable to carry out work; up 50% waking time

3 – Capable of limited self-care; confined to bed or chair more than 50% waking time

4 – Completely disabled; confined to bed or chair

5 – Dead

Anderson, M. K. (2022). Cancer Diagnosis and Staging. In *Cancer Basics*.

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Question

Cancers that arise in glandular epithelium cells is termed

A. liposarcoma.
B. adenocarcinoma.
C. chondrosarcoma.
D. squamous cell carcinoma.

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Immune System Function

- Defense against foreign organisms
- Destruct aging or damaged cells (homeostasis)
- Distinguishes "self" from "non-self"
- Identify and kill cancer cells

Boley, C.L. (2024). Immunology. In *Core Curriculum for Oncology Nursing*

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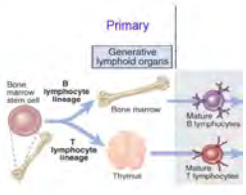
Primary Lymphoid Organs and Tissue

- Hematopoietic stem cell gives rise to
  - **Lymphoid cells**
    - B-cells, T-cells, natural killer (NK) cells
  - **Myeloid cells**
    - Dendritic cells, macrophages, neutrophils, eosinophils, mast cells, megakaryocytes & RBC
- Bone marrow – B-cell differentiation & maturation
- Thymus – T-cell differentiation & maturation



Boley, C.L. (2024). Immunology. In *Core Curriculum for Oncology Nursing*

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Secondary Lymphoid Organs and Tissue

- Bone marrow
- Waldeyer ring (tonsils & adenoids)
- Bronchus-associated lymphoid tissue
- Lymph nodes – initiate immune response in lymph, skin or mucosal surfaces
- Spleen – responds to bloodborne antigens & bacteria
  - Stores platelets & WBC
  - Recycles RBCs
- Lymphoid tissue – GI-associated or urogenital lymphoid tissue

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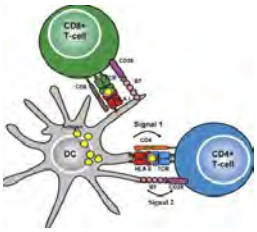
Immune System

Acquired Immunity (cell-mediated)

T-cytotoxic Cells ($CD8^+$)



- at direction of $CD4^+$ cells T_c destroy:
  - viral cells
  - cancer
- plays a role in autoimmunity and solid organ rejection

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Fast....

1st Line Defense

Innate Immunity (Non-specific)

Barriers & Biochemical

- Physical - Intact skin & mucous membranes
- Mechanical – respiratory cilia movement, sneezing, coughing, vomiting & voiding
- Biochemical – mucus, sweat, saliva, tears, flora of GI tract, earwax

Cellular Response (Inflammation)

Vascular Response

- Influx of plasma & fluid to dilute and contain toxins/bacteria
- Influx of macrophages (APC cells) neutrophils & monocytes
- Eosinophils, enzymes & clotting factors prevent spread to healthy tissue
- Complement activation & acute phase protein production (IL-2)
- Triggers acquired immune system

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Regulatory T cells (T_{reg})

- Suppress T-cell immunity
- Suppresses autoreactive T cells against self
- **Treg and Th cells maintain homeostasis**

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SLOW

Immune System

Acquired (cell-mediated) Immunity

***T-helper Cells* - CD4+ cells**

T helper-1 (Th1)

Interact with neutrophils

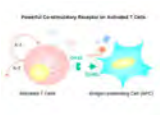
- Secrete cytokines (INF, IL, TNF)
- Develop T-cytotoxic cells

T helper-2 (Th2)

Interact with B-Cells

Enhances:

- Cell division
- Differentiation
- Antibody production



333

Immune System

Dendritic Cells – Star Shaped

https://www.tekportal.net/dendritic-cell/

- Lymphoid or mononuclear phagocytes
- Function as antigen presenting cells (APC)
  - Act as messenger between innate and acquired
- Stimulates both antiviral & antitumor immune responses
- Found in peripheral tissue & migrate throughout lymphatic system
- Influenced by inflammatory responses
- Clinical application: prostate cancer immunotherapy
  - sipuleucel-T (Provenge) autologous vaccine made from dendritic cells

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Immune System
Null Cells

- Separate lineage of lymphoid cells
- Neither T- nor B-cell surface markers

Two Types:

1. **Natural Killer (NK)** - contain substances called ***preforin*** that lyse targeted cells
   - Activity increases in presence of IL-2, IL-12 & IFN-γ
   - Identifies and destructs virus-infected cells and tumor cells

2. **Lymphokine-activated killer (LAK)** – mononuclear cells
   - Lymphocytes removed from patient & cultured with IL-2
   - Creates cytoxicity but must have direct contact with target cell for cytotoxic effect

Boley, C.L. (2024). Immunology. In *Core Curriculum for Oncology Nursing*

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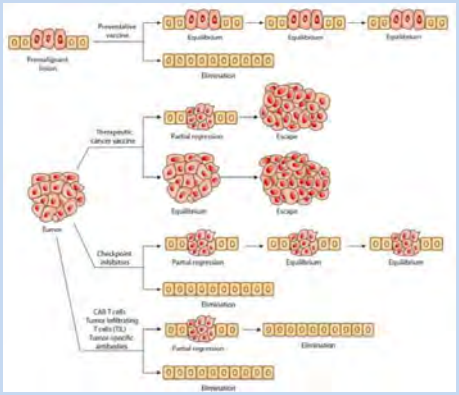

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Immune System
Cytokines

- Small proteins important in cell signaling

Interferon **– INF**
- Anti-viral first responder
- Limits spread of viral infections

Interleukins **– produced by T-cells**
- IL-1, IL-2, IL-4, IL-6 etc.
-

Tumor Necrosis Factor **–** TNF
- Mediates inflammation and cytotoxic reactions

Chemokines
- Guide and activate lymphocytes

Boley, C.L. (2024). Immunology. In *Core Curriculum for Oncology Nursing*

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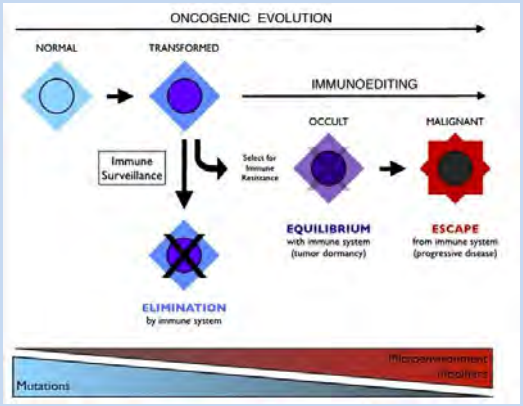

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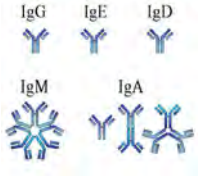
Immune System
B-Cells

- B-cells develop in bone marrow

- Differentiate into plasma cells which produce one of five types of immunoglobulin
  - Think "MADGE"
    - Ig-M - "Me First"
    - Ig-A - Any Orifice
    - Ig-D - Doorbell or "Ding Dong"
    - Ig-G - **GO FOR IT! (most abundant)**
    - Ig-E - Eeeek!



Boley, C.L. (2024). Immunology. In *Core Curriculum for Oncology Nursing*

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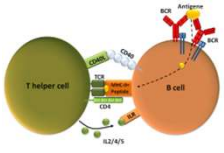
Tumor Immunology

- **Immunosurveillance** – innate and adaptive immune systems identify and control tumor cells
  - *Cancer immunoediting* – disease progression evolution of mutated tumor cells by immune-resistant clones

- **Immune escape** – loss of recognition by cells of immune system leading to tumor escape and cell proliferation



Boley, C.L. (2024). Immunology. In *Core Curriculum for Oncology Nursing*

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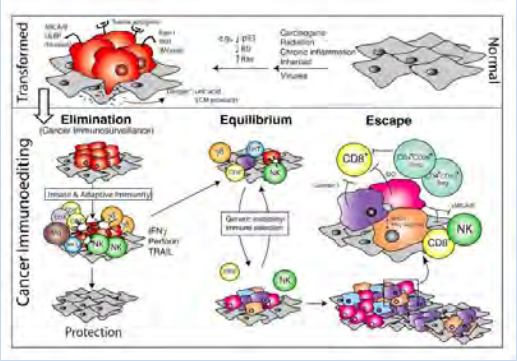

Dunn, G.P., 2004. The Immunobiology of Cancer Immunosurveillance and Immunoediting. 343

343

Question

Which of the following is both primary and secondary lymphoid tissue?

A. Thymus
B. Bone marrow
C. Lymph nodes
D. Spleen

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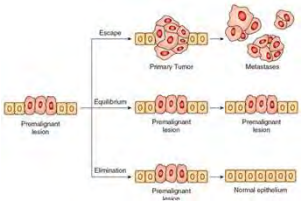
Cancer Immunoediting



Extrinsic tumor suppressor mechanism by NK cells, T-cells, B-cells and dendritic cells result in three sequential phases:

- **Elimination** – destroys growing tumors before clinically detectable
- **Equilibrium** – rare cancer clone acquires resistance to elimination by adaptive system but is stabilized
  - Innate system no longer keeps the tumor in check and allows the tumor clone to enter escape phase
- **Escape** – rare clone results in clinical disease

Boley, C.L. (2024). Immunology. In *Core Curriculum for Oncology Nursing* 344

344

Question

Inflammation is considered a(n)

A. antibody-antigen reaction.
B. cellular immune response.
C. acquired immune response.
D. innate immune response.

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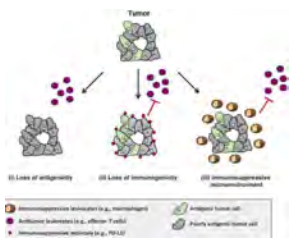
Immune Escape



- Tumor antigen loss or alteration of variants and/or defects in antigen processing or presentation
- Insensitive immune effector mechanisms such as upregulating immune checkpoint molecules like PD1 and PDL-1, which promote T-cell exhaustion and dysfunction
- Immunosuppressive state within microenvironment by cytokines

Boley, C.L. (2024). Immunology. In *Core Curriculum for Oncology Nursing*

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345

Question

Which phase of tumor suppression explains a cancer survivor who is diagnosed with colon cancer ten years later?

A. Progression
B. Escape
C. Equilibrium
D. Elimination

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Question

The sipuleucel-T vaccine is developed from cultured

A. dendritic cells.
B. lymphoid tissue.
C. null cells.
D. T-helper cells.

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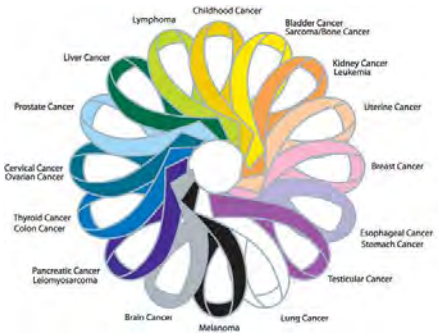
Major Malignancies



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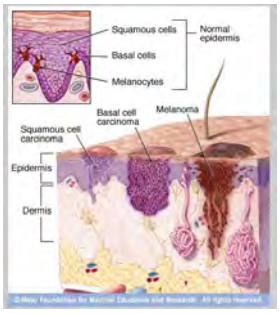
Skin Cancer
Pathogenesis

- Result of unrepaired DNA damage to skin cells triggering pathogenic variants
- Ultraviolet A and UVB ray exposure:
  - Sunlight (solar)
    - UVA – affects deep layers; DNA damage due to free radicals
    - UVB – more carcinogenic than UVA; affects epidermis and dermis causing erythema
  - Tanning beds (artificial)
    - Emit both UVA and UVB rays
    - Risk of melanoma increases by 75% if tanning bed use starts before age 35 (FDA, 2016)

351

Primary Malignant Skin Cancer

- 2 Categories
  - Non-melanoma carcinoma
    - Basal cell (BCC)
    - Squamous cell (SCC)
    - Merkel cell (MCC)
    - Kaposi sarcoma
  - Melanoma



Rubin, K. M. (2024), Skin Cancer. In J. Brandt (Ed.), *Core curriculum for oncology nursing (7th ed.)*

352

Question

The most common form of skin cancer is

A. squamous cell carcinoma.
B. Merkle cell carcinoma.
C. basal cell carcinoma.
D. malignant melanoma.

353

Basal Cell Carcinoma

- The most common form of skin cancer
  - 3.6 million annually
  - 3:1 ratio to squamous cell carcinoma
  - 35% increase in prevalence in the last 20 years
- Slow growing and rarely metastasizes
- Arise from basal cell epithelium
- Associated with variants of PTCH1 and SMO genes of hedgehog signaling pathway and TP53 gene
- 75% first tumors appear on the face
  - raised and shiny with translucent pearly hue
  - ulcerated center with elevated margins

Rubin, K. M. (2024), Skin Cancer. In J. Brandt (Ed.), *Core curriculum for oncology nursing (7th ed.)*

354

Squamous Cell Carcinoma

- 2nd most common skin cancer
  ~ 1.8 million cases per year
- 200% increase in the last 30 years
- Slow growing
- Arises from squamous cell epithelial layer
- Associated with p53 gene pathogenic variant and NOTCH signaling pathway genes
- Appearance varies from round or irregular shape to plaque-like or nodular shape
- **Potential for metastasis regional & distant sites (4%)**
- **1.5% eventually die**

Rubin, K. M. (2024), Skin Cancer. In J. Brandt (Ed.), *Core curriculum for oncology nursing (7th ed.)*

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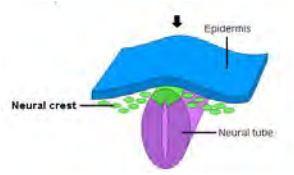
Malignant Melanoma

- Malignancy of pigment-producing cells (melanocytes)
- Originate in neural crest and migrate to skin, meninges, mucus membranes, upper esophagus and eyes
- Most arise in skin



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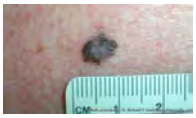
Cutaneous Melanoma



Cancer.org 2021

- 100,640 new cases and 8,290 deaths annually (ACS, 2024)
- 5th most common cancer in both sexes (ACS, 2023)
- Overall 5-year survival rate 94%
  - localized >99%
  - distant 35%
- Most common form of cancer for young adults 25-29 and 2nd most common in 15-29 due to UVR
  - Most diagnosed in non-Hispanic whites (26 per 100,000) compared to Hispanics (4/100,000) and African-Americans (1/100,000)

Rubin, K. M. (2024), Skin Cancer. In J. Brandt (Ed.), *Core curriculum for oncology nursing (7th ed.)*

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Cutaneous Melanoma
Early Detection - ABCDEs

A = Asymmetry

B = Border (Irregular)

C = Color (varied: more than one color within lesion

D = Diameter >6 mm (eraser size)

E = Enlarging or evolving

Rubin, K. M. (2024), Skin Cancer. In J. Brandt (Ed.), *Core curriculum for oncology nursing (7th ed.)*

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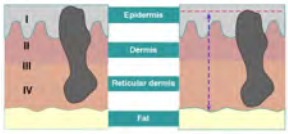
Cutaneous Malignant Melanoma

Localized

- Precursors include atypical nevi and dysplastic nevi
- Larger than 6mm
- Asymmetrical with irregular borders
- ***Color change or variations***
- Prognosis based on depth of invasion and absence of ulceration
- Depth of invasion is measured in millimeters (Breslow depth)
- Pathology report includes histologic sub-types, surgical margins, mitotic rate, size, and microscopic satellites



Rubin, K. M. (2024), Skin Cancer. In J. Brandt (Ed.), *Core curriculum for oncology nursing (7th ed.)*

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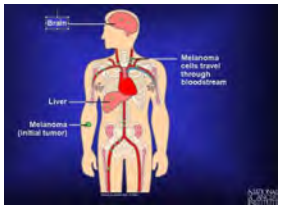
Malignant Melanoma

Metastasizes to regional lymph nodes and distally to
- Distant skin
- Subcutaneous layers
- Lung
- Liver
- Brain (40%)

- Risk dependent upon stage at time diagnosis



Rubin, K. M. (2024), Skin Cancer. In J. Brandt (Ed.), *Core curriculum for oncology nursing (7th ed.)*

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Skin Cancer
Diagnosis and Staging

Basal cell and Merkel cell carcinoma	AJCC staging
Cutaneous squamous cell carcinoma	Multiple staging systems
BCC and SCC require biopsy and excision (Mohs surgery)	
Cutaneous melanoma and Merkel Cell require wide excision	AJCC staging TNM Stage 0 – 4 Mutation status Sentinel lymph node biopsy (SLNB)if >1mm or ulceration present If SLN positive, then completion node dissection of involved lymph node basin(s)

Rubin, K. M. (2024), Skin Cancer. In J. Brandt (Ed.), *Core curriculum for oncology nursing (7th ed.)*

361

Question

Initial treatment for all skin cancers involves

A. chemotherapy.
B. biotherapy.
C. radiation therapy.
D. surgery.

362

Question

Instructions for a melanoma survivor should emphasize

A. weekly skin self-examinations.
B. limiting sun exposure to 2 hours during the summer.
C. clinical evaluations by a dermatologist.
D. use of sunscreen during summer months.

363

Lung Cancer

- 80% of lung cancer deaths due to tobacco use
- Decrease in incidence and mortality for both genders
- Decrease in mortality due to smoking cessation
  - 2.5% per year in men
  - 1% per year in women
- 234,580 new cases and 125,070 deaths annually
  - **Accounts for 20% of all cancer deaths**

Signs & Symptoms
- Persistent cough
- Hemopytsis
- Chest pain
- Voice change
- Increasing shortens of breath
- Recurrent pneumonia or bronchitis

ACS, Facts & Figures, Lung Cancer,2024.

364

Classifications of Lung Cancer
Non-Small Cell Lung Cancer (NSCLC) – 82%

TYPE	LOCATION	METASTASIS
Squamous (30%)	Central Bronchial Tree (Medial)	Liver & Kidney
Adenocarcinoma (45%)	Peripheral Lung Tissue	Highly metastatic to Liver, Lung, Kidney, Bone & CNS
Large Cell (9%)	Peripheral	Liver & bone

- Early-stage treatment options – surgery alone
  - May include chemotherapy alone, targeted therapy or in combination with RT
- Advanced Stage – targeted therapy +/- chemotherapy and/or immunotherapy

Mahon, S. M. (2022). Lung Cancer. In *Cancer Basics*

365

Classifications of Lung Cancer
Small Cell Lung Cancer (SCLC) – 14%

TYPE	LOCATION	METASTASIS
Small Cell	Bronchial Tree	Early to bone

- Neurosecretory granules secrete neuroendocrine hormones
  - Risk for syndrome of inappropriate antidiuretic hormone (SIADH)
- Grows quickly
- Metastasizes early
- Treated with chemotherapy and/or radiation therapy
  - Select Stage 1-2A (T1-2, N0, M0) treated with surgery, post-op chemotherapy, or chemo plus mediastinal RT in node positive patients after surgery

Mahon, S. M. (2022). Lung Cancer. In *Cancer Basics,*

366

Lung Cancer
Staging

- NSCLC
  - TNM Stage 0-4B
- SCLC
  - Limited (30-40% cases)
    - confined to 1 lung and lymph nodes on same side
      - most favorable prognostic factor
  - Extensive (60-70% cases)
    - spread widely to other lung and distant metastases

T/M	Subcategory	N0	N1	N2	N3
T1	T1a	IA1	IIB	IIIA	IIIB
	T1b	IA2	IIB	IIIA	IIIB
	T1c	IA3	IIB	IIIA	IIIB
T2	T2a	IB	IIB	IIIA	IIIB
	T2b	IIA	IIB	IIIA	IIIB
T3	T3	IIB	IIIA	IIIB	IIIC
T4	T4	IIIA	IIIA	IIIB	IIIC
M1	M1a	IVA	IVA	IVA	IVA
	M1b	IVA	IVA	IVA	IVA
	M1c	IVB	IVB	IVB	IVB

AJCC Staging, 2017

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Lung Cancer
Prognostic Factors

Stage of Disease	Outcomes
Localized	63%
Regional	35%
Distant Metastasis • bone, liver, CNS	8%
All stages combined	25% (5-year survival rate) **By Gender:** 21% - men 30% - women

- Only 25% of lung cancers diagnosed at localized stage
- Positive prognostic factors: early stage, good performance status, less than 5% weight loss and female
- 5-year survival rate
  - NSCLC - 30%
  - SCLC - 8%

ACS, Facts & Figures, Lung Cancer, 2024

370

NSCLC
Diagnostic Evaluation

Routine Diagnostics

- Least invasive method
  - Bronchoscopy with biopsy and transbronchial needle aspiration (TBNA)
  - Image-guided transthoracic needle core biopsy
- Transthoracic needle biopsy
- Mediastinoscopy with node biopsy
- Thoracentesis, if effusion detected
- Labs: CBC, LFT, Ca, LDH, BUN, sCr
- PFTs
- PET/CT
- Brain MRI (if symptomatic)

Diagnostic Tools

- Endobronchial ultrasound (EBUS) – guided biopsy
- Endoscopic ultrasound (EUS) guided biopsy
- Navigational bronchoscopy (brush and biopsy)
- Robotic bronchoscopy

Molecular Testing

- EGFR, KRAS, ALK, ROS1, G12C, PARP, BRAF V600E, NTRK1.2.3 gene fusion, METex14, RET, ERBB2 (HER2), PD-L1
- Tissue and liquid biopsy (ctDNA)

Mendenhall, M. (2024). Lung Cancer. In *Core Curriculum for Oncology Nursing*

368

Lung Cancer
Oncologic Emergencies

- Hypercalcemia
- Syndrome of inappropriate antidiuretic hormone (SIADH)
- Spinal cord compression (SCC)
- Superior vena cava syndrome (SVCS)
- Cardiac tamponade
- Uncontrolled pain

Frequent transitions (hospital-home-clinic)

Mendenhall, M. (2024). Lung Cancer. In *Core Curriculum for Oncology Nursing*

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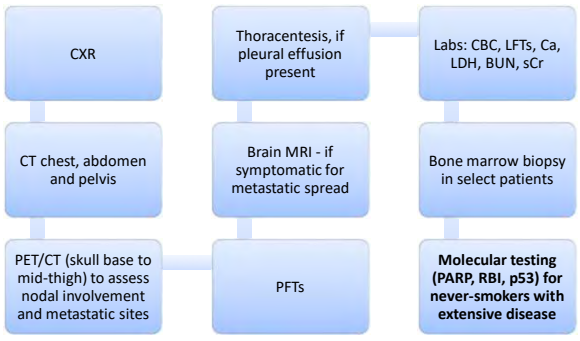
SCLC
Diagnostic Evaluation



369

Question

If the malignancy is localized, surgery is the treatment of choice for lung cancer because

A. immunotherapy is ineffective.
B. surgery offers the option for cure.
C. lung cancer is often a localized disease.
D. surgery involves few complications and few side effects.

372

Question

Small cell lung cancer (SCLC) is histologically distinct from non-small cell lung cancer (NSCLC) because

A. it poses a higher risk for oncologic emergencies.
B. it is more curable.
C. it is more aggressive than NSCLC.
D. it is less aggressive than NSCLC.

373

Staging & Diagnostic Tests

- Clinical breast exam
- Imaging studies:
  - diagnostic mammogram
  - ultrasound, if necessary
  - MRI (optional)
- Tissue biopsy
  - fine needle aspiration
  - core needle biopsy (preferred) stereotactic vacuum-assisted
  - excisional biopsy
- Labs (CBC, LFT, alkaline phosphatase)
- Histological type and grade
- Molecular testing
  - ER/PR status
  - HER2 testing
  - Ki67%
- Multigene assay testing
- Genetic counseling, if at risk

Additional Imaging, if indicated

- CT chest, if pulmonary symptoms
- Abdomen pelvic CT or MRI (if LFTs elevated or symptomatic, stage IIA or higher)
- Bone scan (if symptomatic or elevated alkaline phosphatase)
- PET-CT scan
- Optional bilateral MRI (stages I-3)

Recurrent or stage 4 disease

- Biopsy
- ER/PR and HER2 status
- Comprehensive germline and somatic profiling biomarker testing for additional targeted therapy

NCCN Breast Cancer Clinical Practice Guidelines, v6.2024.

376

Breast Cancer

Epidemiology

- 310,720 new cases invasive breast cancer in women
- 56,500 cases DCIS
- 2790 cases in men
- 42,780 deaths
- Steady decline in mortality 1% annually from 2012-2021 (ACS, 2024) due to earlier detection and treatment improvement
  - Poorer outcomes in Blacks, Hispanics, Hawaiians and Filipinos vs. Whites
  - Mortality in Black women remains 40% higher than in White women (ACS, 2024)
- Metastatic Sites: bone, liver, lungs, adrenals and CNS

ACS Facts & Figures, Breast Cancer 2024

374

Question

Which type of breast cancer carries the worst prognosis?

A. ER-positive, PR -positive invasive ductal carcinoma.
B. ER-negative, PR-negative lobular carcinoma.
C. ER-negative, PR-positive invasive ductal carcinoma.
D. ER-negative, PR-negative, Her-2 negative breast cancer.

377

Question

Which of the following is the most common sign or symptom of early-stage breast cancer?

A. Painless breast lump
B. Skin dimpling
C. Nipple inversion
D. Bloody nipple discharge

375

Breast Cancer Prognostic Variables

- TNM stages 0-4
- Molecular sub-type
  - Luminal A
    - Highly ER/PR positive, lower grade and respond to hormonal therapy
  - Luminal B
    - ER positive, PR negative, higher grade and less responsive to hormone therapy
- Hormone receptor status
  - ER+/PR+ favorable (tamoxifen or raloxifene may prevent recurrence)
- Histological type and grade (1-3)
  - Invasive or high grade can metastasize
- Proliferative rate
  - Ki67%
- Oncogene Her-2 amplified
- High-risk basal cell
  - ER, PR and Her-2 negative (TNBC)
- Germline pathogenic variants

Multigene Tumor Testing

- Oncotype DX
  - 21-gene
- MammaPrint
  - 70-gene
- EndoPredict
  - 12-gene
- Prosigna
  - 50-gene
- Breast Cancer Index (BCI)

Ower, T.J. & R. Park (2024). Breast Cancer. In *Core Curriculum for Oncology Nursing, 7th ed.*, pp. 110-115.

378

Nursing Interventions

- Fertility and reproductive health (premenopausal women)
- Promote self-care
  - enhance adaptation and rehabilitation with altered arm and breast sensation
- Hot flashes
- Vaginal dryness
- Facilitate communication and decision-making style
- Monitor for signs of cardiomyopathy (LVEF, edema, SOB, lung and heart sounds)
- **Precautions for patients at risk for lymphedema**
  - Measure arm circumference
  - Trauma prevention and infection
- Coping skills for feelings about body image, sexually identity and role relationships
- Access to information and community resources
- Long-term follow up
- Survivorship issues

Ower, T.J. & R. Park (2024). Breast Cancer. In *Core Curriculum for Oncology Nursing, 7th ed.*, pp. 110-115.

379

Question

S.G. is a 62-year-old woman treated for Her-2 breast cancer four years ago. Today she complains of back pain and shortness of breath. The oncology nurse expects the following tests to be ordered

A. electrocardiogram, CBC, and chest x-ray.
B. echocardiogram, blood chemistry profile, computed tomography scan of abdomen and pelvis.
C. computed tomography scan abdomen and pelvis, sentinel node biopsy.
D. genomic tumor testing, magnetic resonance imaging, and pulmonary functions test.

380

Question

Patient education teaching points regarding hormone receptor therapy include

A. use in receptor negative disease.
B. taking the medication indefinitely.
C. increase bone density.
D. reduction in risk of recurrence.

381

Ovarian Cancer

- No reliable mass screening tools
- 19,680 cases annually
- 12,740 deaths
  - 5th leading cause of death from GYNE cancer in US
  - 2.5% of all female cancers but 5% of cancer deaths
- 51% overall 5-year survival rate
  - Most are diagnosed in late stages 3 or 4
- 90% are high-grade serous tumors which originate in the fallopian tube

Bolton, D.L. & LaRose L.B. (2024). Reproductive System Cancers. In *Core Curriculum for Oncology Nursing*; ACS, Facts & Figures, Ovarian Cancer, 2024

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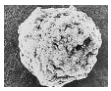
Ovarian Cancer



- Age distribution varies with tumor type, race & ethnicity
  - peaks in late 70's for epithelial tumors
  - 50's for sex cord-stromal tumors (peaks at age 30 in black women)
  - age 15-19 years for germ cell tumors
- Spreads locally to adjacent organs, seeds throughout the peritoneum or lymphatics
  - Stage 3: 80% relapse within 1 year of treatment
  - BRCA-1 mutation more responsive to chemotherapy than BRCA-2 mutation

Bolton, D.L. & LaRose L.B. (2024). Reproductive System Cancers. In *Core Curriculum for Oncology Nursing*; ACS, Facts & Figures, Ovarian Cancer, 2024

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Ovarian Cancer

Diagnostics and AJCC/FIGO Staging

- Transvaginal ultrasound
- Imaging studies CXR, CT/MRI, PET/CT
- Paracentesis with cytology testing
- Colonoscopy to assess for metastatic disease or GI cancer
- Labs
  - CBC, CMP
  - CA-125 antigen for monitoring treatment & recurrence
  - B-HCG and α-FP for germ cell tumors
  - ἀlpha folate receptor
- Genetic germline and somatic testing
- NGS tumor variant testing

Bolton, D.L. & LaRose L.B. (2024). Reproductive System Cancers. In *Core Curriculum for Oncology Nursing*; ACS, Facts & Figures, Ovarian Cancer, 2024

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Ovarian Cancer
Diagnostics and AJCC/FIGO Staging

- Biopsy followed by neo-adjuvant chemotherapy prior to surgery
  - 3-4 cycles of platinum-based therapy
- Surgical staging laparotomy and debulking (TAH-BSO)
  - omentectomy, lymph node biopsies/removal
  - multiple biopsies of bladder, bowel, liver and diaphragm surfaces
  - Appendectomy and other organ removal for advanced disease
- Adjuvant chemotherapy - platinum and taxane
- Hyperthermic intraperitoneal chemotherapy (HIPEC) or pressurized intraperitoneal aerosolized chemotherapy (PIPAC) for select Stage 3
  - cisplatin and gemcitabine
- Targeted therapy for progressive disease and maintenance therapy

Bolton, D.L. & LaRose L.B. (2024). Reproductive System Cancers. In *Core Curriculum for Oncology Nursing*; ACS, Facts & Figures, Ovarian Cancer, 2024

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Ovarian Cancer Issues
Nursing Interventions

- Abdominal carcinomatosis resulting in
- Bowel obstructions
- Malabsorption
- Fluid and electrolyte imbalances
- Frequent hospitalizations
- Symptom control - pain, nausea & vomiting, sleep disturbances, hot flashes etc.
- Coping with chronic illness Advanced disease incurable

Bolton, D.L. & LaRose L.B. (2024). Reproductive System Cancers. In *Core Curriculum for Oncology Nursing*

386

Question

Which of the following tumor markers are elevated in 80% of patients with advanced epithelial ovarian cancer?

A. CEA
B. CA 19-9
C. CA-125
D. CA 27-29

387

Cervical Cancer

Leading world-wide cause of morbidity and mortality especially in underdeveloped countries

4th most common cancer in women worldwide

- 90% of associated deaths in low- to moderate income countries (WHO, 2017) due to lack of prevention, screening, and early treatment resources

US significant decrease due to aggressive screening

- 13,820 new cases and 4,360 deaths

Highly preventable with vaccination and screening

- 60-90% with advanced cases did not obtain Pap test within past 5 years
- HPV causes >99% of cervical cancer cases

Bolton, D.L. & LaRose L.B. (2024). Reproductive System Cancers. In *Core Curriculum for Oncology Nursing*; ACS, Facts & Figures, Cervical Cancer, 2024

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Cervical Cancer
Diagnostic Procedures

Cervical biopsy
- Colposcopy, endocervical curettage, loop electrosurgical excision procedure (LEEP), laser surgery or cone-shaped surgery for precancerous lesions

Labs: CBC, LFTs, renal functions, HIV and HPV testing

Imaging
- Pelvic MRI and PET/CT to rule out metastatic disease
- Cystoscopy and proctoscopy if bladder or rectal invasion suspected

Open abdominal hysterectomy, or vaginal trachelectomy (for fertility sparing) with sentinel lymph node dissection for early-stage (less than IIB)

PDL-1 testing for patients with recurrent, progressive, or metastatic disease

Recommend MMR/MSI for patients with recurrent, progressive, or metastatic disease an/or NTRK gene fusion testing for patients with cervical sarcoma

Metastatic spread – local organs (vagina, bladder, bowel) or distant to lungs

Bolton, D.L. & LaRose L.B. (2024). Reproductive System Cancers. In *Core Curriculum for Oncology Nursing*

389

Cervical Cancer
Staging TNM-FIGO

Stage	Extent of disease	5-year survival
0	Carcinoma in situ (CIN)	~100%
I	Limited to cervix	
Ia1	Microscopic disease: stromal invasion <3mm, lateral spread <7mm	>95%
Ia2	Microscopic disease: stromal invasion <3mm and >5mm, lateral spread <7mm	
Ib1	Macroscopic lesion <4cm in greatest dimension	~90%
Ib2	Macroscopic lesion >4cm in greatest dimension	80-85%
II	Extension to uterus/parametria/vagina	~75-78%
IIa1	Involvement of upper two thirds of vagina *without* parametrial invasion, <4cm greatest diameter	
IIa2	Involvement of upper two thirds of vagina *without* parametrial invasion, >4cm greatest diameter	
IIb1	Involvement of upper two thirds of vagina *with* parametrial invasion	
III	Extension to pelvic side wall and/or lower third of vagina	~47-50%
IIIa	Involvement of lower third of vagina	
IIIb	Extension to pelvic side wall and/or hydronephrosis	
IV	Extension to adjacent organs or beyond true pelvis	~20-30%
IVa	Extension to adjacent organs e.g. bladder, bowel	
IVb	Distant metastases	

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Cervical Cancer Nursing Interventions

Surgery, chemotherapy, hormone therapy, RT, immunotherapy and targeted therapy for advanced stages

Disease or treatment-related symptom control

- Pain, bowel/bladder function, hot flashes, leg swelling
- Teach self-care skills

Reproductive and sexual health

- Contraception during treatment and post-treatment
- Vaginal shortening due to surgery and/or RT
- Lack of lubrication (RT)
- Libido changes
- Use of vaginal dilators, lubricants and/or sexual positioning
- Body image

Signs of recurrent disease: pain, change in bowel/bladder function, bleeding, leg swelling, groin mass

Bolton, D.L. & LaRose L.B. (2024). Reproductive System Cancers. In *Core Curriculum for Oncology Nursing*.

391

Uterine Cancer

Most common and curable gynecological malignancy in US

- 13,820 new cases and 4,360 deaths (ACS, 2024)

25–35% will have recurrent disease

Endometrial lining is hormonally driven, by estrogen and progesterone, for vascular proliferation to support fetal growth

Incidence increased over past several decades due to

- Estrogen exposure (without progestins)
- Obesity
  - adipose tissue converts androstenedione to estrone, thereby, increasing circulating estrogen levels

Bolton, D.L. & LaRose L.B. (2024). Reproductive System Cancers. In *Core Curriculum for Oncology Nursing,* pp. 210-212.

392

Question

Risk factors for endometrial cancer include

A. age 40, high socioeconomic status, and family history.
B. obesity, diabetes, and hypertension.
C. diabetes, early menopause, and obesity.
D. family history and early menopause.

393

Uterine Cancer
Risk Factors

- Age – greater than 55
  - peaks 50-59 (post-menopausal)
- Nulliparity or infertility
- Obesity and physical inactivity
  - 70% of cases
- Type 2 diabetes
- Physical inactivity
- Late menopause
- Irregular menstrual history
- HRT (without progestin)
- Lynch syndrome
  - 65% lifetime risk
- High socioeconomic status
  - Mortality higher in black women due to late-stage diagnosis
- Personal or family history of hyperplasia, breast, ovarian or colorectal cancer
- **Triad of obesity, diabetes & hypertension**
- Tamoxifen use

Bolton, D.L. & LaRose L.B. (2024). Reproductive System Cancers. In *Core Curriculum for Oncology Nursing*, pp. 208-210.

394

Uterine Cancer
Diagnostics & Staging

- Transvaginal ultrasound
  - 90% are endometrial
- Endometrial Biopsy
  - Aspiration or biopsy
  - Endocervical curettage to rule out cervical cancer
  - D&C
  - Hysteroscopy and washings
- Molecular testing
  - Estrogen and progesterone receptors
  - Microsatellite instability
- Labs: CBC, renal and LFTs, CA-125 and pathogenic variant testing including Lynch syndrome
- Imaging: CXR, CT or CT-PET or MRI
- Proctoscopy and cystoscopy for bowel or bladder involvement
- Staging: TNM-FIGO stage 0-4
- Metastatic spread to adjacent organs: vagina, ovaries, and lungs

Bolton, D.L. & LaRose L.B. (2024). Reproductive System Cancers. In *Core Curriculum for Oncology Nursing,* pp. 208-210.

395

Nursing Interventions

- Lifestyle modifications
  - Maintain ideal body weight
  - Lymphedema education
- Symptom control
  - Pain
  - Altered bladder and bowel function
- Prevention of post-op venous stasis
- Signs of recurrent disease
  - Vaginal bleeding
  - Change in bowel habits – constipation
  - Pelvic pain

396

Colorectal Cancer

- 106,590 colon and 46,220 rectal cancer cases and 53,010 deaths (ACS, 2024)
- 3rd in incidence in US and 2nd worldwide for men and women
- 1% decrease in mortality (65 and older) due to better screening and treatment (2011-2019) but 1-2% increase (mid-1990's) in those younger than 55
- 2nd in mortality for men and 3rd for women in US
- Prognosis depends on stage of CRC at diagnosis

ACS Colossal Colon

Most preventable cancer due to screening programs

Lara, T. (2024). Gastrointestinal Cancers. In *Core Curriculum for Oncology Nursing* (pp. 120–121).

397

Colon Cancer
Diagnostic Tests Exams

Risk factors: age >50, race, familial clustering (Lynch syndrome), familial pathogenic variant (FAP, MUTYH), ulcerative colitis, and Crohn's disease

Chemoprevention for high-risk: regular use of nonsteroidal anti-inflammatory drugs e.g. aspirin and NSAIDS

Colonoscopy with biopsy

Labs – CBC, LFT, CEA

CT chest abdomen and pelvis

Molecular testing: K-RAS/NRAS, BRAF in patients with metastatic disease; MSI in select patients

- 40% of patients will have mutation

Mismatch Repair (MMR) gene testing for Lynch syndrome especially if age<45

Lara, T. (2024). Gastrointestinal Cancers. In *Core Curriculum for Oncology Nursing* (pp. 120–121).

398

Colon Cancer
Diagnostics & Staging

Staging: TNM stages 0-4C

Metastatic spread — local extension to peritoneum and lymphatics; hematologic spread to liver and lung

Patients with liver and/or lung metastasis may still be surgical candidates depending on position and extent

Colectomy with minimum 12 lymph nodes required for correct staging

Lara, T. (2024). Gastrointestinal Cancers. In *Core Curriculum for Oncology Nursing* (pp. 120–121).

399

Pancreatic Cancer

No routine screening

- Endoscopic ultrasound or MRI/MRCP for high-risk persons with Lynch syndrome, BRCA-1 or BRCA-2 variant, Peutz-Jeghers syndrome

90% adenocarcinoma

66,440 cases and 51,570 deaths annually (ACS, 2024)

Overall, 5-year survival rate is 13%

- Local disease survival is 44% (10% cases)
- Distant disease survival is only 1% (53% cases)

4th in cancer mortality (ACS, 2024)

Risk factors: age, tobacco use, obesity, alcohol abuse, poor diet, diabetes, periodontal disease, family history, African American, inherited genetic syndromes, chronic pancreatitis, and liver cirrhosis

Lara, T. (2024). Gastrointestinal Cancers. In *Core Curriculum for Oncology Nursing*

400

Pancreatic Cancer
Diagnostic Tests and Staging

Pancreatic protocol	Pancreatic protocol CT or MRI guided endoscopic biopsy CA 19-9 biomarker Molecular profiling (KRAS>90%) Genetic (germline) testing
Staging AJCC TNM and Grades 1-3	Resectable (1A-2A), unresectable (2B-4) and borderline resectable (close to major blood vessels)
Metastatic spread: regional lymph nodes, liver and lungs	May invade visceral organs of the duodenum, stomach, colon, and peritoneal cavity

Lara, T. (2024). Gastrointestinal Cancers. In *Core Curriculum for Oncology Nursing*

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Gastric Cancer

- Esophageal or stomach
  - esophagogastric junction (EG) most common
- 95% adenocarcinoma
  - 2 types
    - Intestinal or diffuse (associated with gastritis) – better prognosis
    - Diffuse, infiltrative or endemic associated with genetic factors and family history
- 5% lymphomas, carcinoid and stromal tumors
- Spreads through direct extension to liver, diaphragm, pancreas, spleen & colon and/or lymphatics and bloodstream to liver
- Risk Factors
  - Age, male, family history, EBV, previous gastric surgery, gastric polyps, inherited cancer syndromes
  - Diet high in salt or smoked foods, smoking, obesity, H. pylori, gastric ulcers, alcohol abuse

Lara, T. (2024). Gastrointestinal Cancers. In *Core Curriculum for Oncology Nursing*

402

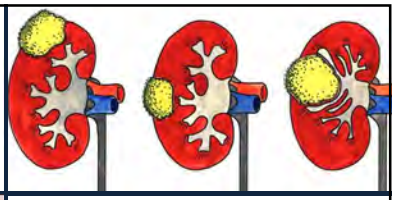
Gastric Cancer
Diagnostics and Staging

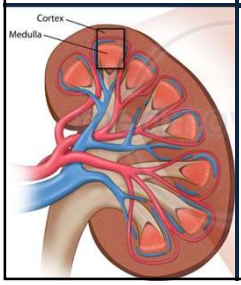
- Endoscopic ultrasound and biopsy
- CT chest
- CT abdomen (EG junction - plus pelvis)
- MRI
- PET scan
- Molecular testing
  - Microsatellite instability (MSI) and DNA mismatch repair (MMR) testing, if metastatic disease suspected
  - HER-2 and PD-L1 testing, if metastatic adenocarcinoma is documented or suspected
- TNM Stages 0–4

Lara, T. (2024). Gastrointestinal Cancers. In *Core Curriculum for Oncology Nursing*

403

Kidney Cancer





- Classifications
  - Clear cell or non-papillary (75-85%)
  - Papillary renal cell (RCC) 10-15%
  - Chromophobe renal cell carcinoma
  - Oncocytic RCC
  - Collecting duct carcinoma
  - Unclassified RCC
  - Tumors of renal pelvis
  - Urothelial or transitional cell
- Tend to grow toward the medulla

Green, L. (2024). Genitourinary Cancers. In *Core Curriculum for Oncology Nursing.*

406

Kidney Cancer

- No screening tests
- ⅔ found during incidental CT scans are diagnosed at local stage
- 81,610 new cases and 4,390 deaths
  - Kidney and renal pelvic cancer is 6th most common in males and 9th in females
- Incidence rate increased 1.5% annually (2015-2019)
- Mortality rate declined by 1.6% per year (2012-2021)
- 5-year survival rate 79%
  - Local – 93%
  - Regional – 74%
  - Metastatic – 17%
- Responsive to immunotherapy (INF and IL-2), checkpoint inhibitors, and targeted therapy rather than chemotherapy or RT

ACS, Cancer Facts & Figures (2024).
Green, L. (2024). Genitourinary Cancers. In Core Curriculum for Oncology Nursing, 2nd ed., pp. 127-130. 404

404

Kidney Cancer
Diagnostic Tests and Staging

- Diagnostic tests: **CT (preferred)**, kidney, ureter and bladder (KUB), renal US, **intravenous pyelography (IVP)**, renal angiography, MRI, retrograde urography
- TNM Stages 0-4 and grading
- Metastatic pattern: lungs, abdominal and mediastinal lymph nodes, liver and bone
  - 30% present with metastasis at diagnosis
  - 40% recur with metastases despite early-stage disease
- Prognostic factors - age, histologic grade & type, stage, performance status, low Hgb, ↑serum LDH, time to appearance of metastasis and prior nephrectomy

Green, L. (2024). Genitourinary Cancers. In *Core Curriculum for Oncology Nursing*

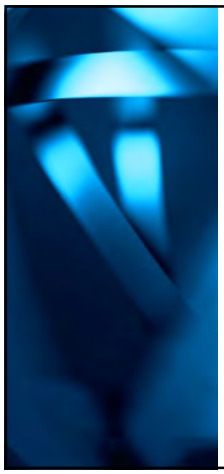
407

Kidney Cancer
Risk Factors

- Gender
  - Male to female ration 2:3
- **Obesity and smoking tobacco**
  - **Account for 50% of cases**
- Diet high in fat or protein and low in antioxidants
- Chronic hypertension
- Chronic renal failure
  - Dialysis-related cystic kidney disease
- Chemical exposure
  - Trichlorethylene, petroleum, heavy metals, asbestos
- NHL and sickle cell disease
- Radiation treatment
- Hereditary conditions
  - Hippel-Lindau disease
  - Hereditary papillary renal carcinoma

Green, L. (2024). Genitourinary Cancers. In *Core Curriculum for Oncology Nursing*

405



Bladder Cancer

95% are urothelial carcinoma (formerly transitional cell)

Papillary are aggressive - indicates pathogenic variant in chromosome 9 and an overexpression of VEGF

83,190 new cases and 16,840 deaths (ACS, 2024)

Risk factors
- Gender: Male to female 4:1
  - 4th most common cancer in males and 8th most common cause of mortality
- Genetics and family history
- Race: 2:1 white versus black men
- Tobacco
- Occupational risk: dye, rubber, leather, aluminum industries; fire fighters, and painters
- Arsenic in drinking water
- Poor fluid intake

Metastasizes to lymph nodes, bones, lung, liver, and peritoneum

Green, L. (2024). Genitourinary Cancers. In Core Curriculum for Oncology Nursing

408

Bladder Cancer
Diagnostic Tests and Staging

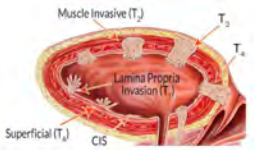


Image: https://www.dcurology.net/common-problems/bladder-cancer.php

- **Most important feature of disease progression is depth of bladder wall invasion**

- Cystoscopy with biopsy
- FDA-approved urinary assay tests
- IVP excretory urography (visualize location)
- Imaging: Pelvic CT or MRI
- Grading: X, 1,2,3, 4
- TNM stage 0-4
- Prognostic indicators: tumor grade, size, location, biomarkers (p21 gene and ki67 antigen) and response to treatment
- 5-year survival rate: 78%
  - Local – 71%
  - Regional – 39%
  - Metastatic – 8% (ACS, 2024)

Green, L. (2024). Genitourinary Cancers. In Core Curriculum for Oncology Nursing

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Prostate Cancer
Diagnostic Tests

- PSA density and velocity
  - 0-4 ng/mL standard norm
- Digital rectal exam (DRE)
- Transrectal Ultrasound (TRUS) and biopsy
- Bone scan to evaluate bone metastasis if PSA>10 or symptomatic
- Imaging: Pelvic CT or MRI
- Labs
  - calcium
  - acid phosphatase

Green, L. (2024). Genitourinary Cancers. In Core Curriculum for Oncology Nursing.

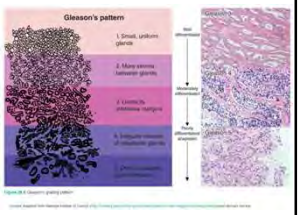
412

Prostate Cancer

- Leading male cancer
  - 30% of all male cancers
  - 1:6 incidence
  - 1:35 mortality
- 299,010 new cases and 35,250 deaths (ACS, 2024)
- 5-year survival rate 97%
  - Local and regional >99%
  - Metastatic 54% (ACS, 2024)
- 95% adenocarcinoma

Routine screening not recommended

Gleason Score



Green, L. (2024). Genitourinary Cancers. In Core Curriculum for Oncology Nursing

410

Prostate Cancer Staging
TNM & Gleason Score

AJCC PROGNOSTIC STAGE GROUPS*

Group	T	N	M	PSA (ng/mL)	Grade Group
I	cT1a-c	N0	M0	PSA <10	1
	cT2a	N0	M0	PSA <10	1
	pT2	N0	M0	PSA <10	1
IIA	cT1a-c	N0	M0	PSA ≥10 <20	1
	cT2a	N0	M0	PSA ≥10 <20	1
	pT2	N0	M0	PSA ≥10 <20	1
	cT2b	N0	M0	PSA <20	1
	cT2c	N0	M0	PSA <20	1
IIB	T1-2	N0	M0	PSA <20	2
IIC	T1-2	N0	M0	PSA <20	3
	T1-2	N0	M0	PSA <20	4
IIIA	T1-2	N0	M0	PSA ≥20	1-4
IIIB	T3-4	N0	M0	Any PSA	1-4
IIIC	Any T	N0	M0	Any PSA	5
IVA	Any T	N1	M0	Any PSA	Any
IVB	Any T	Any N	M1	Any PSA	Any

*Note: When either PSA or Grade Group is not available, grouping should be determined by T category and/or either PSA or Grade Group as available.

Grade Group	Gleason Score	Gleason Pattern
1	≤6	≤3+3
2	7	3+4
3	7	4+3
4	8	4+4, 3+5, 5+3
5	9 or 10	4+5, 5+4, 5+5

Gleason 8-10 is aggressive with poor prognosis

Metastatic spread: lung, liver, adrenal glands, kidneys, bones

AJCC, 2018

413

Prostate Cancer
Risk Factors

- Age – 50+ yrs
  - 60% diagnosed ≥age 65
  - risk increases each decade of life
- Black men in US and Caribbean have highest incidence in the world
  - 70% higher in Black men than White men in US
- Higher mortality in Western versus Asian countries
- Smoking and obesity may increase risk of fatal prostate cancer
- 1st or 2nd degree relative
- **Genetic pathogenic variants**
  - HPC1 gene on chromosome 1
    - linked to 33% hereditary cancer and 3% of cases overall
  - BRCA1 and BRCA2
  - Lynch syndrome

Green, L. (2024). Genitourinary Cancers. In Core Curriculum for Oncology Nursing

411

Prostate Cancer
Complications

- Incontinence
  - Prostatectomy - 3-87%
  - External RT – 3-7%
  - Seed Implant RT – 6%
- Urethral strictures, sloughing, & bladder outlet obstruction
- Erectile dysfunction
  - Less with nerve-sparing prostatectomy
  - 6-61% after brachytherapy
- GI dysfunction associated with both external RT and RT seed implant
  - Diarrhea
  - Proctitis
  - Rectal bleeding
- Spinal cord compression in advanced disease

Green, L. (2024). Genitourinary Cancers. In Core Curriculum for Oncology Nursing

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Testicular Cancer

- Rare in USA i.e. 1% of males
- 9,760 new cases and 500 deaths (ACS, 2024)
- Most commonly occurs age 15-35
- Less common in African Americans and Asian/Pacific Islanders
- 5-year overall survival rate 97%

Bolton, D.L. and LaRose, L.B. (2024). Testicular Cancer: Reproductive System Cancers in Core Curriculum for Oncology Nursing

415

Testicular Cancer

Risk Factors

- Family history of germ cell tumors (3-12x risk)
- Cryptorchidism (20-40x risk)
- Testicular dysgenesis
  - Abnormalities in utero during fetal formation
- Klinefelter syndrome

D.L. and LaRose, L.B. (2024). Testicular Cancer: Reproductive System Cancers in Core Curriculum for Oncology Nursing 7th ed., pp. 218-219.

416

Testicular Cancer Diagnostic Tests

- Testicular exam
- Testicular ultrasound
- Inguinal orchiectomy
- Labs
  - Serum tumor markers
    - αFP & ß-hCG (embryonic protein & hormone)
    - Repeat after surgery for staging purposes
  - LFTs
  - Lactate dehydrogenase (LDH)

Imaging

- CT abdomen/pelvis
- CXR
- CT chest
  - If CXR or CT abdomen is positive
- Brain MRI (if indicated)
- PET – seminomas only
- Sperm banking prior to surgery and further treatment, if indicated

Bolton, D.L. and LaRose, L.B. (2024). Testicular Cancer: Reproductive System Cancers in Core Curriculum for Oncology Nursin.

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Testicular Cancer Classifications

Seminoma Germ Cell Tumor (GCT)

- 95% of cases
- Less aggressive and spread slowly through lymphatics
- Secrete **ß-hCG**
- LDH (prognostic indicator)

Non-Seminomas (NSGCT)

- More aggressive
  - 60-70% lymph node spread
- 4 Types
  - Embryonal – 20%
  - Choriocarcinoma
  - Teratomas
  - Yolk sac
- Mix of 4 types is most common
- AFP is secreted in addition to **ß-hCG**

Bolton, D.L. and LaRose, L.B. (2024). Testicular Cancer: Reproductive System Cancers in Core Curriculum for Oncology Nursing

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Testicular Cancer Staging and Classification

- **Based on CT, MRI and post-orchiectomy tumor markers**

TNM Staging – includes tumor markers

- Good Risk - Stage 1 to 3A
- Intermediate Risk – Stage 3B
- Poor Risk – Stage 3C
- Seminomas are good or intermediate risk only
- Brain Metastases

Metastatic Spread

- Direct to adjacent tissue
- Lymph nodes
- Hematologic spread to lung, brain, and bones

Bolton, D.L. and LaRose, L.B. (2024). Testicular Cancer: Reproductive System Cancers in Core Curriculum for Oncology Nursing

419

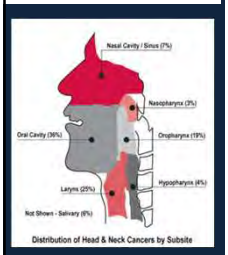
Question

Serum markers for testicular cancer include

A. CA-125.
B. CEA.
C. β-hCG.
D. CA19-9.

420

Head and Neck Cancer



- Cancers of oral cavity, nasopharynx, larynx, oropharynx, nasal cavity paranasal sinuses, hypopharynx, salivary glands, thyroid and parathyroid
- 3-5% of all cancers

Oral and Pharynx

- 58,450 new cases and 12,230 deaths (ACS, 2024)
- 3x higher in males
- 90% squamous cell
- HPV-related cancer carries a better prognosis
- 5-year overall survival rate 69%
  - Oral and pharynx: 70% in White and 55% Black population (reflects higher HPV-associated cancer in Whites)
  - Laryngeal cancer: 62%
  - Thyroid 99% (ACS, 2024)

Rummel, M. (2024). Head and Neck Cancers. In *Core Curriculum for Oncology Nursing.*

421

Head & Neck Cancer
Risk Factors

- **Tobacco and alcohol** – smokeless included
- **Viruses** – HPV-16, EBV, and HSV Type 1
  - In US - ↑ incidence of HPV-related oropharyngeal cancer
- Use of Paan (betel quid) common in Southeast Asia
- EBV (nasopharyngeal and salivary gland)
- Male to female 2:1
- >Age 50
- Gastric reflux
- History of neck radiation
- Sun exposure (lip and skin cancer)
- History of neck radiation
- Diet
- Environmental exposure to wood, dust, and asbestos
- Polycyclic hydrocarbons in plastics, pesticides, dyes, crude oil and roofing tar

Rummel, M. (2024). Head and Neck Cancers. In *Core Curriculum for Oncology Nursing*

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Head & Neck Cancer
Diagnostic Tests and Staging

- Exam – palpation and mirror exam
- Imaging studies – CT, CXR, Panorex, MRI, esophagography, PET-CT
- Lab tests – CBC, LFT
- Biopsy – FNA, excisional, incisional or panendoscopy
- Molecular tissue testing – p16 & p53 protein, and HPV
- TNM Stages 0-4C determines treatment options
  - Most are stage 3 or 4 and are aggressive
  - Metastatic spread to lungs, then liver and bones

Rummel, M. (2024). Head and Neck Cancers. In *Core Curriculum for Oncology Nursing*

423

Head & Neck Cancer
Functional Impact

- **Respiratory Tract**
  - Infection
  - Compromised airway (tracheostomy may be required)
  - Loss of smell with upper airway involvement
- **Speech**
  - Loss of tone and quality
  - Laryngectomy may be required
- **Swallowing**
  - Aspiration
  - Decreased mastication leading to malnutrition
- **Salivary production**
  - Impaired digestion
  - Dental hygiene (dental caries or osteonecrosis of jaw – ONJ)
- **Mobility of mouth** (trismus – lockjaw)
  - Loss of jaw strength

Rummel, M. (2024). Head and Neck Cancers. In *Core Curriculum for Oncology Nursing*

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Nursing Interventions
Coordination of Care

- Pre-op education
- Tracheostomy care (temporary or permanent)
- Oral hygiene
- Pain management
- Nutrition
  - Swallow evaluation and nutrition consult
  - Enteral feeding
- Mobility and Strength evaluation prior to treatment
  - PT evaluation for spinal accessory nerve & sternocleidomastoid muscle involvement
  - Speech Therapy
- Body image changes

Rummel, M. (2024). Head and Neck Cancers. In *Core Curriculum for Oncology Nursing*

425

Bone and Soft Tissue Cancer

- Osteosarcoma
  - Most common sub-type
    - Knee
    - Femur
    - Proximal humerus
- Ewings Tumor
  - Pelvis
  - Chest wall
  - Legs
- Rare types
  - Chondrosarcoma
  - Pleomorphic sarcoma
  - Fibrosarcoma
  - Giant cell tumor
  - Chordoma

- Diagnostic tests
  - Imaging
    - X-ray
    - Bone scan
    - CT
    - MRI
    - PET
    - Angiogram
  - Biopsy
  - IHC staining
  - Molecular testing
  - Labs: elevated Alk Phos and LDH
- AJCC TNM Staging and Grading 1 (low) or 2 (high)
- Metastatic pattern
  - Lymph nodes
  - Distant sites

Young, K. and Whetzel, T. Bone and Soft Tissue Cancers in Core Curriculum for Oncology Nursing 426

426

Neurologic Cancer

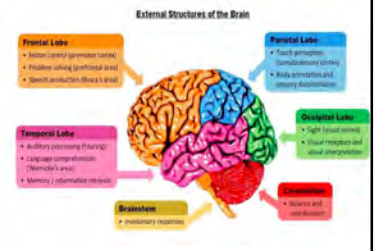
- **Prognostic Factors**
  - Location of tumor
  - Stage and grade of tumor
- **Classifications**
  - Gliomas (75% of cases)
  - Ependymomas
  - Primitive neuroectodermal cells (PNETS)
    - Medullobastomas
    - Ependymoblastomas
    - Pinealoblastomas
  - Primary CNS Lymphoma
  - Meningioma 37%
  - Neuroma
  - 20-40% of cancer patients develop brain metastasis
    - Lung
    - Breast
    - Colorectal
    - Kidney
    - Unknown primary

Gill, J.M. (2024). Neurologic System Cancers in Core Curriculum for Oncology Nursing

427

Neurologic Tumor
Diagnostic Tests

- Imaging studies
  - X-ray
  - CT brain and spine
  - MRI
  - PET
- Tissue Biopsy
  - Bone marrow biopsy for CNS lymphoma
- Diagnostic lumbar puncture
- Serum tumor markers
  - Alpha-fetal protein (AFP)
  - Beta human chorionic gonadotropin (β-hCG)
  - placenta-like alkaline phosphatase (PLAP)



Gill, J.M. (2024). Neurologic System Cancers in Core Curriculum for Oncology Nursing, 7th ed., pp. 197-207.

428

428

Neurologic Tumor
Staging and Testing

Staging
- WHO classification
  - Grade 1-4
- Non-primary CNS tumor use TNM stage 4

Biomarker Testing
- 1p19q codeletion
- ATRX gene
- BRAF
- EGFR
- IDH
- INI
- PTEN
- TERT
- MGMT

Gill, J.M. (2024). Neurologic System Cancers in Core Curriculum for Oncology Nursing, 7th ed., pp. 197-207.

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Neurologic Cancer
Nursing Implications

- Treatment toxicities
- Spinal cord compression
- Increased ICP
- Seizure management
- Steroid-induced hyperglycemia
- VTE prevention and management
- Symptom management
  - Fatigue
  - Nausea and vomiting
  - Headache
  - Dizziness and coordination
- Quality of life measurement
- Survivorship
- Caregiver strain

Gill, J.M. (2024). Neurologic System Cancers in Core Curriculum for Oncology Nursing, 7th ed., pp. 197-207.

430

Question

Which primary site tumor most commonly metastasizes to the brain?

A. Colorectal
B. Endometrial
C. Lung
D. Multiple myeloma

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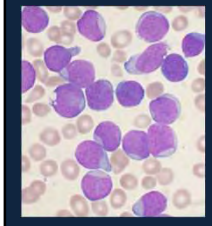
Hematologic Malignancies
Leukemia



- Occur at any age
  - 90% occur in adults
  - Acute myelogenous leukemia and chronic lymphocytic leukemia most common form in adults
  - Acute lymphoblastic leukemia (ALL) most common in children
- 62,770 new cases and 23,670 deaths (ACS, 2024)
  - 9th in incidence in males and 10th in females
  - 6th in mortality for males and 8th for females
- Symptoms depend on cell type, burden, degree of myelosuppression, and organ involvement (spleen, liver, CNS, lymph nodes)
- Treatment occurs over months to years

ACS, Cancer Facts & Figures, 2024

432

Leukemia Classification

WBC Maturity	Myeloid	Lymphoid
Acute Excessive immature cells or ***blasts*** (>20% in marrow or blood) - Arise quickly	**AML** acute myelogenous leukemia - Common in adults - Acute promyelocytic Leukemia (APL) is the most curable sub-type	**ALL** acute lymphoblastic leukemia - Common in children
Chronic mature cells Excessive and non-functional - Progresses slowly	**CML** chronic myelogenous leukemia - Common in adults	**CLL and Small Lymphocytic Lymphoma** chronic lymphocytic leukemia - Common in elderly adults

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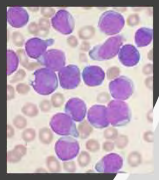
Risk Factors

High-level radiation therapy and nuclear accidents	Chemotherapy e.g. alkylating & topoisomerase inhibitors	Other medications e.g. chloramphenicol and phenylbutazone
Congenital disorders - Down syndrome, Turner syndrome, Klinefelter syndrome, Faconi anemia and Bloom syndrome	Germline AML predisposition mutations	Myelodysplastic syndrome (MDS)
Occupational exposure: • benzene during oil refining or rubber manufacturing (AML) • Agent orange (CLL) • Formaldehyde • Pesticides and herbicides	Virus – HTLV-1	Cigarette smoking (AML)

Moldre, L., Buan-Lagazo, N.C., & A.M. A., Buano-Lagazo (2024). Leukemia. In Core Curriculum for Oncology Nursing, 7th ed., pp. 167–176.

434

Acute Leukemia Symptoms



- Fevers
  - Recurrent infections
- Fatigue
- SOB
- Bruising & bleeding
- Leukocytosis
- Skin infiltrates
- Lymphadenopathy
  - Most common in ALL or CLL
- Splenomegaly
- Hepatomegaly
- Anemia
  - Pallor
- Rash
- Weight loss
- Joint pain
- Testicular swelling (ALL)

Moldre, L., Buan-Lagazo, N.C., & A.M. A., Buano-Lagazo (2024). Leukemia. In Core Curriculum for Oncology Nursing, 7th ed., pp. 167–176.

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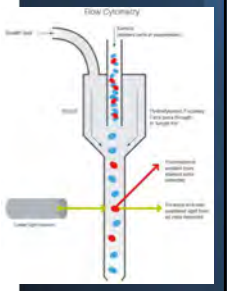
Diagnostic Tests & Procedures
AML

- CBC with peripheral smear
- Bone marrow aspirate and biopsy (cell morphology, cellularity, immunophenotyping, cytogenetics)
- NGS molecular analysis
  - c-KIT, FLT-3 , NPM1, CEBPA, IDH1, IDH2, TP53, RUNX1, PML-RARA,GATA2 mutations
- Flow cytometry
- Human leukocyte antigen (HLA) testing, if transplant candidate
- CT brain, if hemorrhage suspected
- Brain MRI, if meningitis suspected
- PET/CT, if extramedullary disease suspected
- Lumbar puncture, if symptomatic
- ECHO or MUGA
- Central venous catheter insertion
- Consider early palliative care

WHO classification – AML with genetic abnormalities



Moldre, L., Buan-Lagazo, N.C., & A.M. A., Buano-Lagazo (2024). Leukemia. In Core Curriculum for Oncology Nursing, 7th ed., pp. 167–176.

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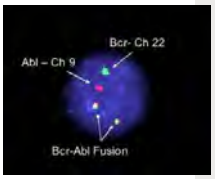
Diagnostic Tests and Procedures
CML

- CBC with differential
- Peripheral blood smear
- Fluorescence in situ hybridization (FISH)
  - **Philadelphia chromosome (t 9:22)**
- Bone marrow aspirate and biopsy
- Cytogenetics
- Reverse transcriptase polymerase chain reaction (RT-PCR) blood or bone marrow for BCR-ABL1
  - TKI inhibitor selection based on risk stratification e.g. imatinib, dasatinib, nilotinib, bosutinib, ponatinib, asciminib, or omacetaxine
- Monthly pCR monitoring until stable, then quarterly



FISH Test

Moldre, L., Buan-Lagazo, N.C., & A.M. A., Buano-Lagazo (2024). Leukemia. In Core Curriculum for Oncology Nursing

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CML Phases or Category

Chronic – <10% blasts (possibly asymptomatic)

Accelerated – ≥15 to <30% blasts

Increase in spleen size & WBC unresponsive to therapy	Persistent thrombocytopenia	B symptoms: fatigue, night sweats, weight loss splenomegaly	Clonal evolution by cytogenetics

Blast crisis – ≥30% blasts

extramedullary disease	B symptoms, bleeding and infection

Moldre, L., Buan-Lagazo, N.C., & A.M. A., Buano-Lagazo (2024). Leukemia. In Core Curriculum for Oncology Nursing

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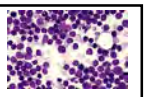
Diagnostic Tests & Procedures

ALL



- Evaluation and treatment at specialized treatment center
- Bone marrow aspirate & biopsy with cytogenetics
  - Presence of lymphoblasts
  - 25% of adults - Ph+ Chr *(BCR-ABL1)*
  - Other genetic abnormalities: hyperdiploidy or hypodiploidy, translocations etc.
  - Molecular genetic variants - Next Generation Sequencing
- Screen for infection
- Testicular examination or ultrasound
- Classification by WHO ALL subtypes, cytogenetics, and risk group
- Cytogenetic Risk Group
  - BCR-ABL 1-like (Ph-like) ALL
  - JAK-STAT
  - ABL class
  - Other (NTRKr, FLT3r, LYNr, PTK2Br)
  - T(17;19): TCF3-HLF fusion
  - Alterations of IKZF1

Moldre, L., Buan-Lagazo, N.C., & A.M. A., Buano-Lagazo (2024). Leukemia. In Core Curriculum for Oncology Nursing

439

Diagnostic Tests & Procedures ALL

- CBC
  - ↓RBC, ↓Plt, ↑↓WBC
- DIC panel
- Serum chemistry - ↑LFT
- Tumor lysis panel
  - Uric Acid, K, Ca, Phos, LDH
- Flow cytometry
- Lumbar puncture with chemotherapy
- Imaging tests
  - CT/PET/MRI
- MUGA/Echo for anthracycline therapy
- HLA typing for transplant
- Central line

Moldre, L., Buan-Lagazo, N.C., & A.M. A., Buano-Lagazo (2024). Leukemia. In Core Curriculum for Oncology Nursing, 7th ed., pp. 167–176.

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Nursing Implications

- Individualized holistic plan of care
- Referral to mental health specialists
- Community resources
  - Leukemia & Lymphoma Society ACS
- Health education
  - disease, side effects, infection/bleeding precautions, treatment plan
- Fertility counseling
- Pharmacologic & nonpharmacologic interventions
- Blood product transfusions
- Monitor for & prevent treatment-related complications
  - TLS, sepsis, cardiac toxicity, steroid toxicities, coagulation disorders, electrolyte imbalances
- Central line care, if applicable

Moldre, L., Buan-Lagazo, N.C., & A.M. A., Buano-Lagazo (2024). Leukemia. In Core Curriculum for Oncology Nursing

441

Question

A lab value commonly seen in acute leukemia is

A. elevated BUN and creatinine.
B. platelet count greater than 150,000 µL.
C. International normalized ratio (INR) 1.0
D. presence of peripheral blasts.

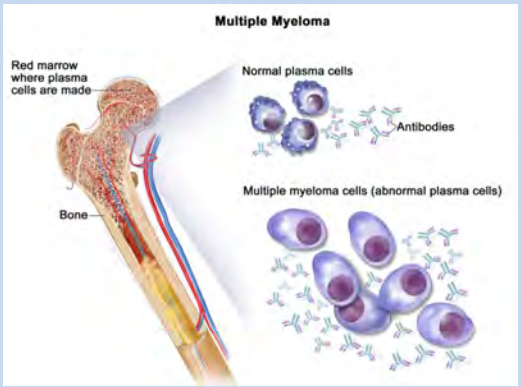
442

Question

E.M. presents with a diagnosis of AML, an absolute neutrophil count of 500, hemoglobin 6.2 g/dL, and platelet count of 12,000 µL. The nurse can likely expect E.M. to experience

A. bruising, enlarged lymph nodes and fever.
B. bruising, fever and gingival bleeding.
C. early satiety, enlarged lymph nodes and recurrent infections.
D. night sweats, bone pain and malaise.

443



444

Question

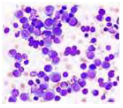
The oncology nurse knows that the three pathologic features of multiple myeloma include

A. polycythemia, elevated BUN, and hypercalcemia.
B. hyperkalemia, osteolytic bone lesions, anemia.
C. osteolytic bone lesions, renal disease, hypercalcemia.
D. peripheral blasts, renal dysfunction, immunodeficiency.

.

445

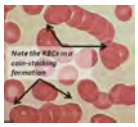
Multiple Myeloma



- Plasma cell cancer (B-cells)
- 38,570 new cases & 12,540 deaths (ACS, 2024)
  - Second most common hematologic malignancy

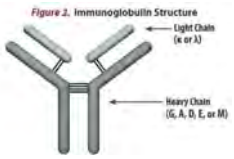
CRAB criteria:
- **C**alcium elevation in blood >10.5 ng/L
- **R**enal Insufficiency – serum creatinine >2mg/dL
- **A**nemia – Hgb <10 g/dL
- **B**one osteolytic lesions

- Bone marrow biopsy shows >10% clonal plasma cells
- Peripheral blood smear reveals Rouleaux formation



- **SLIM criteria:**
  - **S** - Clonal bone marrow plasma cells ≥60%
  - **LI** – involved serum free light chain ratio ≥100
  - **M** – focal lesion on MRI

Myeloma or monoclonal protein (M protein)
- Serum Protein electrophoresis - ↑ heavy-chain M proteins
- Urine Protein immunoelectrophoresis -↑ light-chain M proteins (kappa & lambda)
  - **M proteins - Bence Jones proteins**
- IgG myeloma is the most common subtype



Multiple Myeloma. (2022, December 8). NCCN. https://www.nccn.org/professionals/physician_gls/pdf/myeloma.pdf

446

Multiple Myeloma

STAGE	Revised International Staging System (R-ISS)
I	ISS stage I Standard-risk chromosomal abnormalities by FISH trisomy trisomy (4;14) translocation (6;14) Normal LDH Serum LDH <upper limit of normal
II	Not stage I or III
III	ISS stage III Either high-risk chromosomal abnormalities del(17p) and/or t(4;14) and/or t(14;16) or Serum LDH >upper limit of normal

Multiple Myeloma. (2022, December 8). NCCN. https://www.nccn.org/professionals/physician_gls/pdf/myeloma.pdf

447

Question

Pain in a patient with multiple myeloma commonly results from

A. intestinal obstructions.
B. marrow infiltration.
C. neural infiltration of plasma cells.
D. osteolytic bone lesions.

448

Nursing Interventions

- Chronic illness
  - **No cure**
- Pain management – osteolytic lesions or fractures
- Renal failure
- Infection

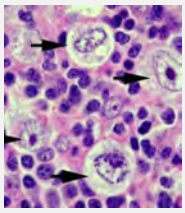
Oncologic Emergencies
- Tumor Lysis Syndrome (TLS)
- SVC obstruction
- Spinal cord compression
- Hypercalcemia
- VTE/DVT

Multiple Myeloma. (2022, December 8). NCCN. https://www.nccn.org/professionals/physician_gls/pdf/myeloma.pdf

449

Lymphocytic Malignancies
Hodgkin Lymphoma

- 8,570 new cases annually
  - 4,630 males
  - 3,940 females
- 910 deaths annually (ACS, 2024)
- Bimodal age incidence
  - 15-35
  - 55+
    - Poorer outcomes due to mixed cellularity, symptomatic disease, co-morbidities, EBV+, performance status
- Unknown cause
- Risk factors
  - Infection with EBV, HIV, HCV, c. psittaci, H. pylori
  - family history lymphoma
  - solid organ transplant
  - allogeneic HSCT
  - primary immunodeficiency
  - prior chemotherapy



Price, T. (2024). Lymphoma. In Core Curriculum for Oncology Nurses, 7th ed., pp. 183-185..

450

Lymphocytic Malignancies
Hodgkin Lymphoma

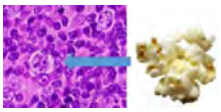
Diagnostics

- Bone marrow biopsy
  - 95% Classic Hodgkin Lymphoma (CHL)
    - ***Reed Sternberg* cells**

- 5% nodular lymphocyte-predominant Hodgkin lymphoma (NLPHL)
  - ***Popcorn* cells**
- 80% cure rate
- Extent of disease and B-symptoms dictates the stage
  - Prognosis is most closely related to stage of disease at diagnosis and not the histologic type

B Symptoms

- Pruritus
- Fever & chills
- Night sweats
- Anorexia and/or weight loss
- Weakness
- SOB



Price, T. (2024). Lymphoma. In Core Curriculum for Oncology Nurses.

451

Question

The prognosis of Hodgkin Lymphoma is closely linked to

A. histologic sub-type.
B. stage of disease at diagnosis.
C. absolute lymphocyte count.
D. lactic dehydrogenase serum level.

452

Hodgkin Lymphoma

Lugano Classification System (Ann Arbor Staging System)

- **Favorable Disease**
  - Stage 1A or 2 A without risk factors and non-bulky disease
- **Unfavorable Disease**
  - Stage 1 or 2 with risk factors: large mediastinal mass, extranodal involvement, 3+ nodal areas, elevated sedimentation rate or B symptoms
- **Advanced Disease**
  - Stage 3 or 4
  - 4 or more risk factors
    - Male
    - age >/= 45
    - Hgb <10.5 g/dL
    - stage 4 disease
    - WBC >/= 15,000/mm3
    - absolute lymphocytic count </= 600/mm3 or <8% total WBC
    - albumin <4 g/dL

Hodgkin Lymphoma. (2022, November 8). NCCN. https://www.nccn.org/professionals/physician_gls/pdf/hodgkins.pdf

453

Question

L.S. presents in clinic today with a diagnosis of advanced Hodgkin Lymphoma. Which of the following symptoms would the nurse anticipate L.S. to report?

A. Memory loss and fatigue
B. Bone pain and anorexia
C. Extreme thirst and night sweats
D. Fever and night sweats

454

Question

The most effective treatment for a patient with Hodgkin lymphoma experiencing pruritis is

A. antihistamines.
B. chemotherapy.
C. oatmeal baths.
D. narcotics.

455

Non-Hodgkin Lymphoma

Epidemiology

- 80,620 new cases (ACS, 2024)
  - 44,590 males & 36,030 females
  - 7th most common cancer in males and 6th in females
- 20,140 deaths (ACS, 2024)
  - 9th month common cause of death for both genders
- Wide range of histologic sub-types
  - Diffuse large B-cell (most common)
  - Follicular (25%)
  - Burkitt
  - Marginal zone
  - MALT
- Prognosis is related to histologic type
- Median age 67
- Unknown cause

Risk Factors

- Age
- Gender
- Obesity
- Immunodeficiency disorders inherited or acquired
- Solid organ transplant
- Infectious agents
  - EBV - Burkitt
  - HTLV-1 - T-cell lymphoma
  - HIV
  - H. Pylori – MALT stomach
  - Hepatitis B and C – DLBC & follicular
- Environmental exposure
  - Chemical exposure – chemicals, pesticides, and solvents
- Radiation

Price, T. (2024). Lymphoma. In Core Curriculum for Oncology Nurses

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Non-Hodgkin Lymphoma

Diagnostic Tests and Staging

- Excisional biopsy
  - Histologic sub-types: Follicular, Mantle Cell, Marginal Zone, Burkitt, DLBC etc. is closely linked to prognosis
- Radiographic studies
  - CT chest/abdomen/pelvis
  - PET
- Bone marrow biopsy (optional)
- IHC (CD 20+, CD10+) and cytogenetics
- NGS mutations
- HIV testing
- Labs
  - CBC, CMP, LDH, uric acid
- International Prognostic Index (IPI)
- Lugano Classification System (Ann Arbor Staging System)

Price, T. (2024). Lymphoma. In Core Curriculum for Oncology Nurses, 7th ed., pp. 185-187.

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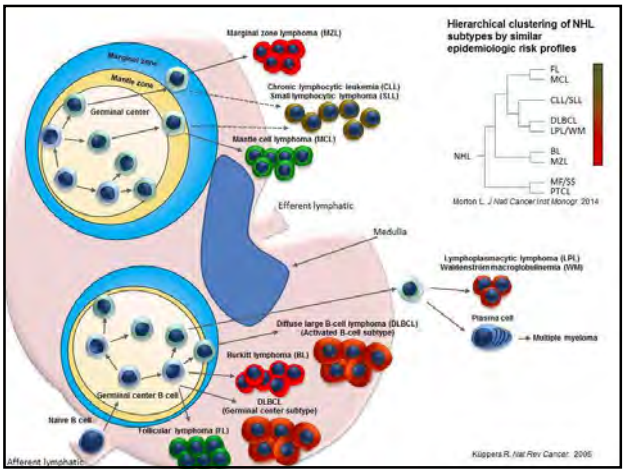

458

NHL Lymphoma
Lugano Classification System (Ann Arbor Staging System)

- **Early Favorable**
  - Stage 1 or 2 without risk factors
- **Early Unfavorable**
  - Stage 1 or 2 with risk factors
  - B symptoms
- **Advanced Favorable**
  - Stage 3 or 4 with 0-3 risk factors
- **Advanced Unfavorable**
  - Stage 3 or 4
  - 4 or more risk factors

Price, T. (2024). Lymphoma. In Core Curriculum for Oncology Nurses, 7th ed., pp. 185-187.

460

Question

Risk factors related to non-Hodgkin lymphoma include

A. Immunodeficiency or organ transplant.
B. Tobacco usage and high fat diet.
C. Whooping cough or rheumatic fever.
D. Barrett esophagitis.

461

NHL
International Prognostic Index
Low Grade (Indolent) or High Grade

Risk Factors

- Age
  - > 60 yrs = 1
- Tumor stage
  - Stage 3 or 4 = 1
- Nodal involvement
  - >1 = 1
- Performance status
  - >2 = 1
- Serum LDH
  - Abnormal = 1

IPI Risk Score

International Prognostic Index

- Low (0-1)
- Intermediate (2)
- High-Intermediate (3)
- High risk (4-5)

Price, T. (2024). Lymphoma. In Core Curriculum for Oncology Nurses..

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Clinical Trials and Research Protocols

- **Research protocol:** detailed written plan of a clinical trial
- **Clinical research:** involve voluntary human subjects
- **Types of clinical research**
  - **Interventional or Experimental Study**
    - Participants are assigned to a group
    - Purpose is to assess safety, efficacy and effectiveness of a biomedical or behavioral intervention (prevention, screening, diagnostic, treatment/ therapeutic, or QoL/supportive care i.e. reduce toxicity)
  - **Observational Study**
    - Does not involve an intervention
    - Purpose is to assess health outcomes in groups of humans

Seria, M. G., & Kesari, S. (2020). Clinical Trials and Research Protocols. In Core Curriculum for Oncology Nursing (pp. 85–91). Oncology Nursing Society.

462

Scientific Research Elements

- Problem/purpose
- Literature critique
- Theoretical framework
- Design/method
  - Qualitative
  - Quantitative **
    - Parallel randomized
    - Crossover
    - Basket (any cancer sharing same specific target)
    - Umbrella (same cancer but different potential targets)
- Sample size
- Data collection
- Data analysis
- Findings
- Implications
  - Recommendations for practice

*gold standard is prospective randomized controlled double-blind clinical trials

Garia, G. M., & S. Kesari, T. (2024). Research Protocols and Clinical Trials In Brant, J. M., Cope, D. G., & M. G. Saria (Eds). *Core curriculum for oncology nurses*, 7th ed., pp. 98-105.

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Study Designs

Randomized

- Parallel Group
- Crossover
  - Allows patient to receive more than one treatment
- Factorial
- Randomized Withdrawal

Newer Study Designs

- Adaptive randomization methods
- Seamless
- Internal Pilot
- Stepped-wedge Cluster Randomized trial

Garia, G. M., & S. Kesari, T. (2024). Research Protocols and Clinical Trials In Brant, J. M., Cope, D. G., & M. G. Saria (Eds). Core curriculum for oncology nurses.

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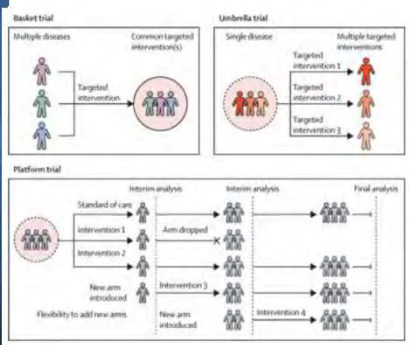
Master Protocol Study Design



https://www.ucl.ac.uk/early-phase-cancer-trials/patients-public/taking-part-clinical-trial/what-different-types-clinical-trials-are-there

465

Clinical Trials

- Formal study to investigate the systemic effects of a medication
  - Safety, effectiveness and toxicity evaluations
- FDA approval is needed for an investigational new drug number (IND)
- Trial begins once clinical trial protocols are established
- Institutional Review Board (IRB) must review and approve all trials
  - **Purpose is to protect human subjects**
- **Data Safety and Monitoring Board (DSMB)** provides oversight and monitoring to confirm safety of subjects and integrity of research study and data
- Testing is done in USA prior to FDA approval and commercial marketing

Price, T. (2024). Lymphoma. In Core Curriculum for Oncology Nurses, 7th ed., pp. 185-187.

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Phase	Study Design and Purpose
1	15-60 healthy patients (patients for whom standard therapy failed) • **Maximum tolerated dose (MTD) and safety** • Pharmacokinetics • Schedule • Dose adjustments for medical conditions • Drug interactions
2	100-300 • **Effectiveness of drug or regimen** and additional safety data • Randomize patients to one of several treatment groups
3	100's-1000's patients • **Compares study drug to standard treatment** • Time to progression • Overall survival (OS) • Quality of life (QOL)
4	100s-1000s • **Long-term safety and expanded use (supplemental application)** • assess risks, benefits and use in real-life scenarios • assess effect in specific populations (e.g. pregnant women, children) • determine cost effectiveness

Garia, G. M., & S. Kesari. T. (2024). Research Protocols and Clinical Trials In Brant, J. M., Cope, D. G., & M. G. Saria (Eds). *Core curriculum for oncology nurses*.

467

Question

Which code of ethics and conduct primary focuses voluntary consent in research?

A. Belmont Report
B. Declaration of Helsinki
C. US Common Rule
D. Nuremberg Code

468

Nurses' Role in Clinical Trials

- Recognize every patient has clinical trial participation potential
- Support prospective participants
  - Assist patients to find clinical trials and resources
  - Resource: http://clinicaltrials.gov
- Belmont Report 1979
  - Principles of respect, beneficence, and justice
- Nuremberg Code
  - Voluntary consent required
- US Common Rule
  - Informed consent and IRB protection of human subject

Saria, M. G., & Kesari, S. (2024). Clinical Trials and Research Protocols. In Core Curriculum for Oncology Nursing 7th ed., pp. 98–105.

469

Nurses' Role in Clinical Trials

- Protection of human subjects
  - Ensure informed consent obtained
  - Vulnerable populations include children, pregnant women, prisoners & mentally disabled
- Communication with clinical trials nurse
- Administration of treatment
  - Dose and regimen must be clear, easy to follow and expressed consistently throughout protocol
- Evaluation of patient pre-treatment
  - Affirms verbal informed consent
- Monitor for adverse effects
- Assessment for delayed toxicities

Garia, G. M., & S. Kesari. T. (2024). Research Protocols and Clinical Trials In Brant, J. M., Cope, D. G., & M. G. Saria (Eds): *Core curriculum for oncology nurses*

470

Question

The goal of Phase 4 clinical trials is to

A. Determine maximum tolerated dose.
B. Compare a study drug to standard therapy.
C. Determine tumor responsiveness.
D. Assess long-term safety.

471

Question

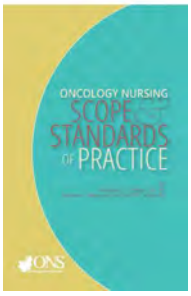
Your patient asks you if he should participate in a clinical trial. What is the best nursing response?

A. Your oncologist always has your best interest at heart.
B. I can bring the oncologist back to review the risks and benefits.
C. Your involvement will make a difference to your outcomes.
D. The most important thing is for you to feel personally informed and comfortable with your decision.

472

ONS Scope and Standards Oncology Nursing Practice 2019

- **Benchmark for care and professional performance**
- Serves as a powerful guide to evidence-based quality cancer care
- Indicates to society that oncology nurses can define and govern quality cancer care
- Includes generalist and advanced practice (APRN - NP and CNS)



Lubejko, B. G., & Wilson, B. J. (2019). In *Oncology Nursing Scope & Standards of Practice*. Oncology Nursing Society.

473

Oncology Nursing Practice Competencies

- **Deliver** • Deliver patient-centered care
- **Function** • Function within an interdisciplinary team
- **Use** • Use evidence-based practice (EBP) to improve quality of care

Lubejko, B. G., & Wilson, B. J. (2019). In Oncology Nursing Scope & Standards of Practice. Oncology Nursing Society.

474

Standards of Practice

Professional nursing activities demonstrated through the nursing process:

- Assessment
- Nursing Diagnosis
- Outcome Identification
- Planning
- Implementation
  - Coordination of care
  - Health teaching and health promotion
- Evaluation (measurable patient outcomes)

Lubejko, B. G., & Wilson, B. J. (2019). In Oncology Nursing Scope & Standards of Practice. Oncology Nursing Society.

475

Oncology Practice 15 Areas of Focus

- Health promotion, screening, early detection, and genetic risk
- Patient and caregiver education
- Factors in treatment planning
- Safe administration of cancer treatments
- Symptom management
- Psychosocial support
- Oncologic emergencies
- Survivorship
- Supportive and palliative care
- End-of-life care
- Coordination of care
- Interprofessional collaboration
- Evidence-based practice
- Legal and ethical issues
- Patient and caregiver advocacy

Lubejko, B. G., & Wilson, B. J. (2019). In Oncology Nursing Scope & Standards of Practice. Oncology Nursing Society.

476

Scope & Standards Oncology Nursing Practice

- Applies to job descriptions, performance appraisals and peer reviews
- Basis for quality assessment and quality improvement
- Generates research questions
- Provides foundation for evidence-based practice
  - ONS website https://www.ons.org/clinical-tools

Lubejko, B. G., & Wilson, B. J. (2019). In Oncology Nursing Scope & Standards of Practice. Oncology Nursing Society.

477

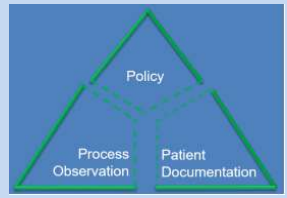
Question

The Quality Oncology Practice Initiative certification program, specific to chemotherapy administration safety in the ambulatory setting is administered by

A. American Society of Clinical Oncology.
B. Oncology Nursing Society.
C. American College of Surgeons.
D. National Comprehensive Cancer Centers.

478

ASCO-Quality Oncology Practice Initiative (QOPI) Certification



https://practice.asco.org/quality-improvement/quality-programs/qopi-certification-program/about-qopi-certification

4 Domains

- Safe environment
  - Staffing and policies
- Patient consent and education
- Ordering, preparing, dispensing and administration
- Patient monitoring
  - Adherence
  - Toxicities
  - Complications

44 Standards and 151 Elements
(ASCO-ONS Antineoplastic Safety Standards, 2024)

- Policy
- Process Observation
- Clinical Documentation

479

479

Oncology-Specific Accreditation/Certification Quality Standards

- American College of Surgeon (ACOS)
  - Commission on Cancer (CoC)
    - https://www.facs.org/quality-programs/cancer/coc
  - National Accreditation Program for Breast Centers (NAPBC)
    - https://www.facs.org/quality-programs/napbc
- American Society Clinical Oncology (ASCO)
  - Quality Oncology Practice Initiative (QOPI)
    - https://practice.asco.org/quality-improvement/quality-programs/qopi-certification-program
- Foundation for the Accreditation of Cellular Therapy (FACT)
  - http://www.factwebsite.org/

480

480

Question

The PDSA (plan, do, study, act) model of quality improvement can used to

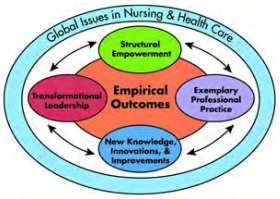
A. plan and direct a special assignment.
B. prepare for certification.
C. perform clinically relevant research.
D. propose a review of a clinical pathway or process.

481

ANCC Magnet Nursing Accreditation

Mission

- Excellence through leadership, scientific discovery and dissemination and implementation of new knowledge



Magnet Model. (n.d.). American Nurses Credentialing Center. https://www.nursingworld.org/organizational-programs/magnet/magnet-model/

484

Quality Improvement

- CLABSI reduction
- Fall prevention and reduction
- Cancer services – Risk-based screening
- Documentation – Patient Reported Outcomes (PRO)
- Ambulatory Infusion Unit
  - Staffing Model
  - Treatment Delays

Lubejko, B. G., & Wilson, B. J. (2019). In Oncology Nursing Scope & Standards of Practice. Oncology Nursing Society.

482

Question

Which national organization issues patient safety goals which are annually updated?

A. Institute of Medicine.
B. The Joint Commission.
C. National Institute for Health.
D. Occupational Safety and Health Administration.

485

Question

Nursing Magnet accreditation is administered by

A. The Joint Commission.
B. Institute of Medicine.
C. Oncology Nursing Certification Corporation.
D. American Nurse Credentialing Center.

483

2024 Hospital National Patient Safety Goals

(Easy-To-Read)

https://www.jointcommission.org/-/media/tjc/documents/standards/national-patient-safety-goals/2024/hap-npsg-simple-2024-v2.pdf

Legal Issues

Agencies and Programs in Health Care

- **The Joint Commission**
  - **National Patient Safety Goals**
- Center for Disease Control (Standards)
  - Guidelines for infection control
- National Institute for Health (NIH)
  - National Cancer Institute (NCI)
- Department of Health and Human Services
  - Center for Medicare and Medicaid (CMS)
  - National Institute for Occupational Safety and Health (NIOSH) research agency
    - Safe Handling of Hazardous Drugs (USP 800)
    - Radiation Safety
- Occupational Safety and Health Administration (OSHA)
  - Department of Labor Regulatory Agency
  - Enforces laws and standards in workplace

Galen, N. A. (2020). Legal Issues. In J. M. Brant, D. G. Cope & M. G. Saria (Eds) Core curriculum. (pp. 552-556). J. (2020). Legal Issues. In Core Curriculum for Oncology Nursing. pp. 552-556.

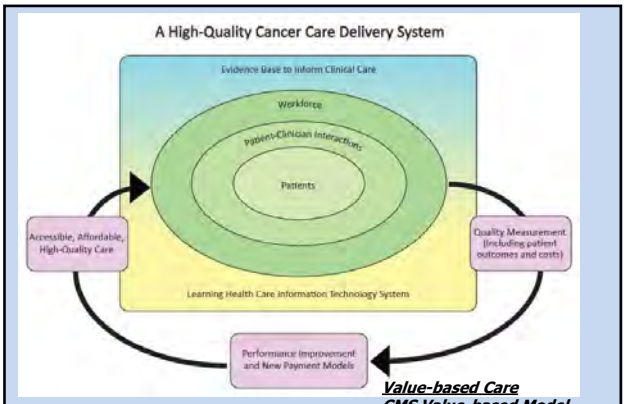
486

Question

The Institute of Medicine paper "Charting a New Course for a System in Crisis" identifies which action to delivering high quality cancer care?

A. Mandating of institutional staffing ratios.
B. Providing free services for clients and families.
C. Reporting of patient outcome data in quality monitoring plans.
D. Monitoring credentials of healthcare professional providing oncology services.

487



Value-based Care
CMS Value-based Model
ASCO Oncology Medical Home

IOM Landmark Report,: Delivering High Quality Cancer Care, 2013

488

Method	Definition	Impact on Practice
Research	Scientific study	Generate new knowledge
Evidence-based Practice	Approach to integrate best evidence with clinical expertise and patient preferences or values	Translate knowledge into practice
Quality Improvement	Combined efforts of a team to make changes in practice which lead to a better outcome	Improve • processes in care (workflow) • Efficiencies Reduce variations in practice

489

489

Question

Evidence-based practice entails

A. focusing efforts on performance improvement.
B. Integrating research findings with clinical expertise and patient values.
C. orienting nurses to risks, including look-alike medications.
D. requiring the reporting of incidents involving patients.

490

EBP

Lubejko, B. G., & Wilson, B. J. (2019). In Oncology Nursing Scope & Standards of Practice. Oncology Nursing Society.

491

Evidence-based Practice Steps

1. **Ask a clinical question of interest**
   – Use PICOT format (Patient population, Intervention, Comparison intervention or group, Outcome & Time)
2. Search for best evidence with a literature search.
3. Critically appraise the research or evidence.
4. Integrate evidence with clinical expertise & patient preferences and values.
5. Evaluate outcomes of a practice change.
6. Share information with colleagues.

Lubejko, B. G., & Wilson, B. J. (2019). In Oncology Nursing Scope & Standards of Practice. Oncology Nursing Society.

492

PICOT Question

- In adult AML patients, is sodium bicarbonate mouth rinse more effective than magic mouthwash in the prevention of mucositis during the post-chemotherapy neutropenic phase?

Population = adult AML patient
Intervention = oral care
Comparison = sodium bicarbonate versus magic mouthwash
Outcome = mucositis reduction
Time = post-chemotherapy

493

Sources of Information for Evidence-Based Practice

- Meta-analysis and systematic review are the gold-standards for clinical information
- Professional Journals and Websites
  - ONS
    - Oncology Nursing Forum
    - Clinical Journal Oncology Nursing
- ASCO
- NCCN

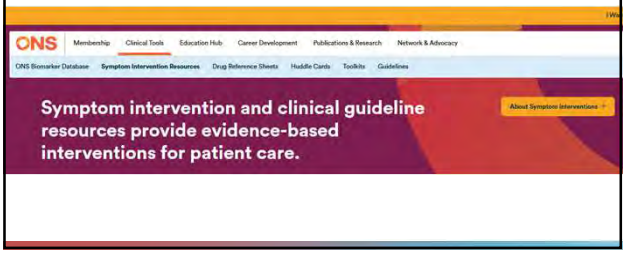
- Practice Guidelines
  - ONS
  - ASCO
  - NCCN

Lubejko, B. G., & Wilson, B. J. (2019). In Oncology Nursing Scope & Standards of Practice. Oncology Nursing Society.

494

Evidenced-Based Practice National Resources

ONS – Clinical Tools	National Library of Medicine PubMed	Cochrane Collaboration	Agency for Healthcare Research and Quality
https://www.ons.org/clinical-tools	https://www.nlm.nih.gov	http://www.cochrane.org	http://www.ahcpr.gov



495

PROFESSIONAL PERFORMANCE EDUCATION and LEARNING

496

Question

Diana has been admitted for shortness of breath related to NSCL cancer. Her mother died at a young age of lung cancer. What approach would the nurse use to address her learning needs?

A. Teach about the pathophysiology of the lungs.
B. Educate her about the causes of lung cancer.
C. Enroll her in a smoking cessation program.
D. Ask her about what she knows about lung cancer and her past experiences with cancer.

497

Education Process Teaching Principles

- Knowles (1970) adult learning theory proposes that adults
  - Are independent and self-directed
  - Should understand why they must learn
  - Have past experiences
  - Learn best in a supportive environment and culture
  - Experience teachable moments

Lubejko, B. G., & Wilson, B. J. (2019). In Oncology Nursing Scope & Standards of Practice. Oncology Nursing Society.

498

Learning Theories

- **Behavioral** – classical conditioning
  - mindfulness exercises
- **Cognitive** – attention & thought to apply information
  - neutropenic patient calls to report a fever
- **Social** – watching & imitating others
  - self-injection video
- **Motivational –** cues that activate behavior
  - smoking cessation
- **Humanistic** – learner-directed approach, spontaneity based on human emotions and feelings
- **Adult (androgogy)** - self-directed, independent and problem-centered

499

Question

L.L. is a 30-year-old female diagnosed with breast cancer. She wishes to discuss findings from an internet search specific to treatment options. Which of the following learning theories is L.L. demonstrating?

A. Pedagogic learning
B. Social
C. Behavioral
D. Adult learning

500

Legal Issues
Sources of Law

- **Statutes:** Laws passed by Congress or state legislatures signed by a president or governor
- **Common Law:** Court made law
  - Serious crimes e.g. felony
    - **Basis for most medical malpractice litigation**
- **Administrative Rule or Regulation:**
  - Statements adopted by an agency (BoN) intended to make the law (Nurse Practice Act) more specific or explain procedures
    - Have the force of law once enacted
    - Negligence e.g., personal phone call when providing care

Salim, N. A. (2024). Legal Issues. In J. M., Brant, D. G. Cope & M. G. Saria (Eds). *Core curriculum*

501

State Boards of Nursing
Disciplinary Cases

- Practice-related
  - Failure to assess a patient or document
  - Practicing outside scope of practice or without a license
- Drug-related
  - Controlled drug diversion
- Boundary violations
- Sexual misconduct
- Abuse
- Fraud
- Positive criminal background checks
- Unprofessional use of social media

Salim, N. A. (2024). Legal Issues. In J. M., Brant, D. G. Cope & M. G. Saria (Eds). Core curriculum for oncology nursing

502

Legislative Policy Issues

- Access to care
- Cancer and care disparities
- Cancer prevention and early detection
- Cost of cancer care
  - "financial toxicity"
- Oncology drug shortages
- Pain Management
- Risk Evaluation Mitigation Strategies (REMS)
- Tobacco products
- Workforce issues e.g. aging workforce, diversity, practicing to full scope of nursing licensure, and baccalaureate-prepared nurses 80% by 2030
- 2030 Future of Nursing goals
  - Promote health equity, address disparities, and grow a more robust and diverse nursing workforce (IOM Report, 2021) .

Salim, N. A. (2024). Legal Issues. In J. M., Brant, D. G. Cope & M. G. Saria (Eds) in core curriculum for oncology nursing.

503

Legal Issues
Oncology Patient

- Advance directives and Living Will
- Decision-making capacity
- **Bankruptcy**
  - cancer survivors are 2x more likely to experience bankruptcy than general population
- Disability insurance
- Employment discrimination
- Genetic discrimination
- Hospital-acquired conditions

Salim, N. A. (2024). Legal Issues. In J. M., Brant, D. G. Cope & M. G. Saria (Eds) in core curriculum in oncology nursing

504

Legal Issues
Oncology Patient

- Human subject research
- Informed consent for chemotherapy
  - oral and parenteral
- Privacy
- Confidentiality
- Survivorship care planning
- Time off work
- Withdrawing treatment

Salim, N. A. (2024). Legal Issues. In J. M., Brant, D. G. Cope & M. G. Saria (Eds) in core curriculum. for oncology nursing

505

Question

According to the National Institute for Safety and Health, surveillance of healthcare workers who handle hazardous drugs should include

A. urine testing for mutagens.
B. demonstration of spill management.
C. observation of chemotherapy administration.
D. health assessment on hire and annual monitoring.

506

Legal Issues
Professional Practice

- Adverse drug events
- Chemotherapy errors
- Control drug handling
- Electronic health record
- Malpractice
  - Misdiagnosis or failure to diagnose
- Negligence - Standard of Care
  - Misuse of equipment
  - Use of social media while working
- Off-label drug or device use
- Mandatory reporting
  - suspected abuse or death
  - communicable diseases
- Environmental hazards
  - Radiation safety
  - Hazardous drug safety – USP 800
    - Personal Protective Equipment (PPE)
    - Safe handling HD

Salim, N. A. (2024). Legal Issues. In J. M., Brant, D. G. Cope & M. G. Saria (Eds) in core curriculum for oncology nursing

507

Question

A patient is prescribed a medication that carries a significant potential for injury according to the Food and Drug Administration. The nurse must ensure the patient is participating in

A. a clinical trial.
B. a risk evaluation mitigation strategies program.
C. a medication reimbursement program.
D. Center for Medicare and Medicaid Services.

508

Legal Issues
Professional Practice

- Risk evaluation and mitigation strategies (REMS)
  - Lenalidomide
  - CAR T-cell therapy
- Scope of practice
- Social media (NCSBN)
- Staff competence
  - chemotherapy administration
- Vesicant extravasations
- Withholding or withdrawing life support
- Workplace behavior and performance issues
  - Lateral violence, bullying, verbal intimidation

Salim, N. A. (2024). Legal Issues. In J. M., Brant, D. G. Cope & M. G. Saria (Eds) in core curriculum for oncology nursing

509

Legal Issues
Minimizing Practice Issues

- Maintain positive patient and family relationships
- Maintain current knowledge skills
- Verify job description fits scope of practice
- Maintain liability insurance
- Keep “Thank You” notes from patients, families and colleagues
- Build positive relationship with supervisors
- Maintain professional boundaries with patients
- Respect physical limitations
  - Fatigue: alertness management
  - Overtime

Salim, N. A. (2024). Legal Issues. In J. M., Brant, D. G. Cope & M. G. Saria (Eds) in core curriculum for oncology nursing

510

Legal Issues
Resources

- American Association Legal Nurse Consultants www.aha.org
- American Nurses Association – www.ana.org
- Cancer Legal Resource Center – www.disabilityrightslegalcenter.org/cancer-legal-resource-center
- National Cancer Legal Services Network – www.nclsn.org
- National Council of State Board of Nursing www.ncsbn.org

Salim, N. A. (2024). Legal Issues. In J. M., Brant, D. G. Cope & M. G. Saria (Eds) in core curriculum for oncology nursing

511

Ethical Issues
Clinical Ethics

Nurses use ethics in everyday nursing practice when she/he:

- Is aware of moral conflicts
- Identifies ethical issues
- Uses the ANA Code of Ethics (2015) www.nursingworld.org
- Advocates for patients
- Shares decision-making with patients and helps to implement moral decisions

Erikson, J. M., & J. Hardin (2024). Ethical Issues. In J. M., Brant, D. G. Cope & M. G. Saria (Eds) in core curriculum for oncology nursing..

512

Question

A family member states, "I don't want my mother to know she has cancer. Tell her she is being treated for an infection. I don't want you discuss her diagnosis with her." Which ethical principle applies?

A. Autonomy
B. Nonmaleficence
C. Veracity
D. Justice

513

Question

A nurse discuss a patient and says, "this patient shouldn't receive oncology care because he is so combative and nasty to us". This an example of a violation of which core ethical principle?

A. Justice
B. Veracity
C. Maleficence
D. Beneficence

514

Ethical Approaches
Principle-based Ethics

- **Veracity** – telling the truth
  - Patient has a right to know
  - Healthcare workers have an obligation to tell the truth
- **Justice** – patient is treated fairly
  - Who decides which patients receive priority treatment? Those who can afford?
  - How do we ration scarce resources?

Erikson, J. M., & J. Hardin (2024). Ethical Issues. In J. M., Brant, D. G. Cope & M. G. Saria (Eds) in core curriculum for oncology nursing..

515

Ethical Approaches
Principle-based Ethics

- **Beneficence** – **"Do Good"** by:
  - inflicting no harm
  - preventing harm
  - removing the source of harm
- **Nonmaleficence** – **Do No Harm**

Erikson, J. M., & J. Hardin (2024). Ethical Issues. In J. M., Brant, D. G. Cope & M. G. Saria (Eds) in core curriculum for oncology nursing..

516

Question

A Spanish-speaking only patient is about to begin chemotherapy. Informed consent requires that the patient receive an explanation in

A. Spanish.
B. American.
C. Spanish or American.
D. both Spanish and American.

517

Question

Oncology nursing certification is a quality indicator that

A. mandates employers to provide incentives to pursue certification.
B. establishes standards of performance in cancer care.
C. provides the public with assurance regarding knowledge and experience of oncology nurses.
D. upgrades nursing services provided by the organization.

520

Informed Consent

- Explanation of medical condition
- Explanation of nature and purpose of the procedure
- Explanation of risks, alternatives, and consequences
  - **Must be provided in patient's preferred language**

Erikson, J. M., & J. Hardin (2024). Ethical Issues. In J. M., Brant, D. G. Cope & M. G. Saria (Eds) in core curriculum for oncology nursing..

518

Quality Cancer Care
Role of Oncology Nurse

- Provide education and support patients/families during decision-making process regarding treatment and cost of care
- Psychosocial support during cancer trajectory
  - Timely referral to palliative and hospice care
- Comprehensive and formal training in end-of-life communication for physicians and nurses
- Multidisciplinary collaboration and coordination of care
- **Professionalism**
  - **Obtain certification (OCN)**
- Evidence-based translational practice
  - Genetics and genomics
  - Cardio-oncology
  - Gero-oncology
  - Palliative care
  - Critical care
  - End-of-life care

Lubejko, B. G., & Wilson, B. J. (2019). In Oncology Nursing Scope & Standards of Practice. Oncology Nursing Society.

521

Ethical Issues
Informed Consent
Role of Oncology Nurse

- Reinforce & clarify information presented by physician or Advanced Practice Provider (APP)
- Notify physician/APP if unable to validate patient's understanding
- Inform physician/APP if medication administration may interfere with patient's understanding
- Confirm documentation of informed consent in medical record

Erikson, J. M., & J. Hardin (2024). Ethical Issues. In J. M., Brant, D. G. Cope & M. G. Saria (Eds) in core curriculum for oncology nursing..

519

Question

On her own accord, a nurse decides to obtain membership to the Oncology Nursing Society. According to ONS this action demonstrates

A. professional practice.
B. education.
C. quality improvement.
D. lifelong learning.

522

Professional Development
Lifelong Learning

- Ongoing growth in personal professional life which strengthens your abilities and skills to function in your role
- Options for professional development:
  - Attendance at continuing education programs
  - ONS membership including local chapters
  - Journal clubs
  - ONS on-line contact hour offerings
    - Articles
    - Podcasts
    - Learning modules and certificates

Lubejko, B. G., & Wilson, B. J. (2019). In Oncology Nursing Scope & Standards of Practice. Oncology Nursing Society.

523

Question

An oncology nurse is constantly thinking about her patients and is tearful during interactions with her colleagues. She most likely is exhibiting signs and symptoms of

A. insomnia.
B. compassion fatigue.
C. denial.
D. anxiety.

524

Compassion Fatigue

525

Professional Development
Compassion Fatigue

Compassion Fatigue – A risk for oncology nurses!

- Nature of working with acutely ill patients experiencing physical, emotional and spiritual stress
- Burnout related to healthcare environment due to staffing issues, overtime, pressure to keep both patients and families satisfied, and quality issues

Lubejko, B. G., & Wilson, B. J. (2019). In Oncology Nursing Scope & Standards of Practice. Oncology Nursing Society.

526

Strategies to Counter Compassion Fatigue

- ❑ Commitment to self-care
- ❑ Strong support network
- ❑ Ask for help from leadership, co-workers or professional counselor
- ❑ Seek ways to gain control/balance between work, home civic responsibilities
- ❑ Recognize staff for contributions to workplace & patients
  - ONS Awards
  - ONCC Annual Awards (OCN of the Year, Employer of the Year)
  - CURE Award (patient & oncology nurse story)
  - Daisy Award

Lubejko, B. G., & Wilson, B. J. (2019). In Oncology Nursing Scope & Standards of Practice. Oncology Nursing Society.

527

Compassion Fatigue and Resilience

https://www.ons.org/nurse-well-being-learning-library

528

Compassion Fatigue

Authentic and Sustainable Self Care Begins With You:

- Be kind to yourself.

http://www.compassionfatigue.org/

529

OCN REVIEW COURSE
Cancer Treatment Modalities

19% Test Content = 31 Questions

530

Goals of Therapy

Prevention	Cure	Control	Palliation
• Avoid disease	• Eradicate cancer cells • No evidence of disease for 5-10 years • Prolong absence of clinically detectable disease	• Advanced stage, recurrence or metastasis • Contain growth without eradicating disease • Could go on for years i.e., chronic	• Quality of life & comfort • Relief of symptoms • May involve any modality • Treatment is shorter/less intense than curative intent

531

Classification of Treatments

Standard Therapy	Investigative Therapy	Complementary, Alternative or Integrative Therapy
Best current therapy based on clinical trials	National Cancer Institute cancer.gov	Diverse medical and healthcare systems, practices, and products and are not presently considered to be part of conventional medicine
National comprehensive cancer network guidelines at nccn.org	Industry sponsored	The National Institutes of Health - National Center for Complementary and Integrative Health (NCCIH)
	Institutional study	

532

Types of Therapy

1. **Local**
   - Surgery
   - Radiation therapy
2. **Systemic**
   - Chemotherapy
   - Biotherapy
     - Cytokines
     - Tumor-infiltrating lymphocytes
     - Growth factors [CSF]
     - Monoclonal antibodies [mAbs]
3. **Targeted Therapies**
   - Biological Therapy
     - Small molecular therapy
   - Immunotherapy
     - Vaccines
     - Bio-engineered agents
     - Checkpoint inhibitors
     - Chimeric antigen receptor (CAR) T-cell therapy
4. **Combination**
   - Surgery
   - Radiation
   - Chemotherapy
   - Biological therapy
   - Hematopoietic Stem Cell Transplantation

533

Cancer Surgery

Goal - Reduce tumor burden to a small number of viable cells that can be destroyed by immune system or cancer therapies

- Oldest and most researched oncology therapy
- Most effective modality to cure cancers
  - As single modality, it is curative therapy for early stage (1& 2) cancers e.g., breast, skin, GI, lung, prostate, lymphoma
    - **Radical surgeries don't increase survival time**
- *Operable* – Is the patient's condition ideal for surgery?
  - Assessment of comorbidities
- *Resectable* – Is it possible to remove the tumor?
  - Functional importance of the organ or structure
  - Ability to reconstruct or restore function

Davidson G.W. 2024. Surgery. In D. G. Cope et. al., (Eds.) in *core curriculum for oncology nursing*

534

Question

A patient is scheduled for a diagnostic breast biopsy involving a large needle. This is an example of a(n)

A. excisional biopsy.
B. aspiration biopsy.
C. core needle biopsy.
D. incisional biopsy.

535

Cancer Surgery
Role

Prevention or Prophylaxis	• Organ removal in high-risk familial cancers e.g., BRCA1, BRCA2, TP53, PTEN, STK11, CDH1, Lynch syndrome, MEN2A e.g., Mastectomy, oophorectomy, colectomy or thyroidectomy
Diagnosis - Biopsy	• Incisional or Excisional biopsy • Fine Needle Aspiration • Core needle biopsy (liver, breast or muscle) • Ultrasound or CT guided
Staging	• Diagnostic laparotomy • Second look response to treatment (less common)
Preservation	• Tissue banking

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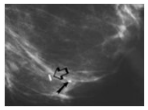
Core Needle Biopsy

- Stereotactic core needle biopsy
- Large, open-bore needle to retrieve a small piece of intact tumor tissue such as
  - Breast mass
  - Muscle mass
  - Liver nodule



https://www.clinicaladvisor.com/slideshow/slides/breast-pain/

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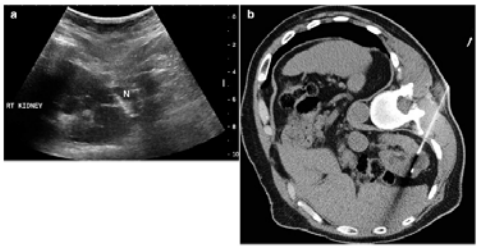
Percutaneous Renal Biopsy



https://radiologykey.com/percutaneous-biopsy-3/

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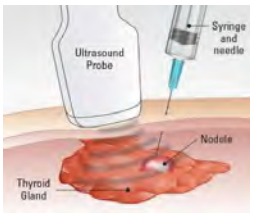
Fine Needle Biopsy

- Use of needle and syringe to aspirate cells from palpable cyst or mass
  - Subcutaneous nodule
  - Fluid-filled cysts
  - Palpable nodule underneath skin suspicious for metastasis



https://www.thyroidcancercanada.org/en/thyroid-cancer/how-its-found

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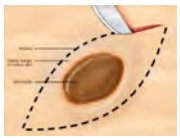
Excisional Biopsy

- Removal of entire discrete mass (2-3 cm in diameter) or lesion with adequate margins for diagnosis
  - Lymph node (lymphoma)
  - Polypoid lesions of colon
  - Basal or squamous cell carcinomas of skin
  - Breast mass using needle localization
  - Metastasis of primary tumor of the lung (wedge resection)
- Wide excision
  - Removal of tumor, adjacent tissue +/- lymph nodes



https://www.mayoclinic.org/tests-procedures/skin-biopsy/multimedia/excisional-biopsy/img-20005766

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Incisional Biopsy

- Removal of portion of a tumor for pathologic diagnosis
- Used on larger masses
  - Subcutaneous mass
  - Abdominal tumor
  - May be obtained through bronchoscopy, colonoscopy, laparoscopy, or thoracoscopy procedures

http://www.drvivekgupta.com/thoracoscopy/

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Robotic Navigational Bronchoscopy

- platform combines three distinct navigation technologies
  - electromagnetics
  - optical pattern recognition
  - robotic kinematic data
- **Triangulates** bronchoscope location during the procedure and provide for accurate positional data to the physician performing a bronchoscopy

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Cancer Surgery

Role

Curative

- Complete resection
  - Primary tumor
  - Lymph nodes
  - Adjacent affected organs
  - Negative margins
- Surgical Methods
  - Local excision
    - Lumpectomy or lobectomy
  - Wide excision of tumor and adjacent tissue
  - Enbloc resection
    - Bulky tumors with contiguous tissues, lymph nodes and vascular tissue
      - Ovarian cancer debulking
- May include regional lymph nodes
  - Sentinel node or complete dissection

Supportive

- Insertion of therapeutic hardware
  - Central lines
  - Ommaya reservoir for CNS therapy
  - AV shunts

Reconstruction or Rehabilitation

- Oncoplastic surgery
  - Microsurgery, reinstruction, restoration of function, repair of defects from radical surgery
  - Breast surgery

Adjunctive

- Decrease risk or spread

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Cancer Surgery

Role

Salvage or Palliative

- Metastatic removal of solitary lesions to reduce pain and/or bleeding
- Cytoreductive surgery e.g., debulking
- Emergency surgery
  - Obstruction or perforation
  - Non-healing wounds (incision and drainage [I&D])
  - Residual cancer
  - Cord compression
- Removal of hormonal influence (ovaries or testes)
- Gastric decompression
  - Gastrostomy or gastrostomy-jejunostomy tube
- Treatment of cancer pain
  - Nerve blocks
  - Cordotomy

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Surgical Approaches

Primary or Definitive Therapy

- Open incision
- Laparoscopic ("ports")
- Endoscopic
- Robotic-assisted
- Local Excision
- Laser therapy
- Photodynamic therapy
- Stereotactic
- Radiofrequency Ablation (RFA)
- Radar localization technology

In Situ treatment

- Electrosurgery
- Cryosurgery
- Chemosurgery
- Endoscopic
- CO_2 laser – vaporizes surrounding tissue

Salvage Therapy

- Relapsed disease

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Surgical Technology

- Radar localization technology
- Indicated for early-stage breast cancer
- Technology used to perform lumpectomy or excision biopsy
- Transmitter seed inserted during pre-operative mammography or ultrasound
- Wand is used in OR to locate transmitter

https://www.merit.com/merit-oncology/localization/breast-soft-tissue-localization/scout-radar-localization/

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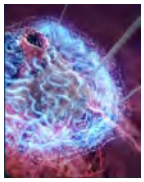
Surgical Technology

- Pancreatic cancer (stage 3) or prostate cancer
- Irreversible Electroporation (IRE) technology
- Creates nanopores in cell walls without destroying vessels, nerves and surrounding tissue



https://www.angiodynamics.com/product/nanoknife-system/#:~:text=The%20NanoKnife%20System%20gives%20a,treatment%20coverage%20for%20your%20procedure.

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Question

The operating suite nurse is speaking to the surgeon and reviews information about the patient, purpose and site. She then asks if there are any questions. This process is called

A. review of systems.
B. sign in.
C. time out.
D. sign out.

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Surgical & Procedural Safety Measures

- Informed consent
- "Surgical Time Out" - right patient, laterality & correct procedure
- **Surgical safety checklist** (WHO, 2009)
  - Anesthesia induction (Sign In)
  - Skin incision (Time Out)
  - Prior to leaving OR (Sign Out)
- Asepsis
- Positioning, padding and restraint
- Electrical safety – grounding of equipment
- Equipment availability, function and processing

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Surgical Care Improvement Plan SCIP

- **Reduce surgical site infections**
  - Antibiotic for select patients – cardiac, vascular, orthopedic, colon, hysterectomy
  - Administered within 1 hour prior to incision and discontinue 24 hr post-incision
    - cardiac surgery discontinue 48 hr post-incision
- Foley catheter removal (Post-op Day 1 or 2)
- VTE prophylaxis
- Post-op serum glucose control less than or equal to 200 mg/dL
- Hair removal – clip hair not shave
- Normothermia in colorectal cancer surgeries

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Perioperative Nursing

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Question

Three general side effects of surgery are

A. infection, bleeding and incomplete wound healing.
B. edema, anasarca and pulmonary edema.
C. deep vein thrombosis, death, and kidney stones.
D. fungal valve deposits, urinary retention and sudden death.

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Question

Which of the following therapies poses a high-risk for post-operative bowel perforation?

A. Cyclophosphamide
C. Rituximab
D. Pembrolizumab
D. Bevacizumab

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Perioperative Nursing
Preparation

- Pre-existing conditions
- Previous surgery, reactions to anesthesia, and blood products
- Previous chemo-immunotherapy, biotherapy, or RT
- Current medications, herbal and vitamin supplements
- Allergies
- Pertinent family & social histories e.g., smoking, alcohol, drug use and ability for self-care
- Obesity
  - STOP-BANG (snoring, tired, observed, pressure, BMI, age, neck size, gender) screening questionnaire
    - If at risk for obstructive sleep apnea and hypoventilation, refer to sleep medicine specialist prior to surgery
- Older adults – Modified Frailty Index to guide exercise and nutritional capacity
- Pregnancy – fetal monitoring non-stress test and tocometry before and after surgery

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Question

Oncology patients benefit from enhanced recovery after surgery (ERAS) protocol by optimizing

A. anticoagulant therapy.
B. adaptation to body image changes.
D. preoperative preparation.
E. antibiotic utilization.

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Enhanced Recovery After Surgery (ERAS)

- Optimize pre-op health 4-6 weeks prior to surgery
  - Alcohol prehabilitation
  - Smoking cessation
  - Correct anemia
    - Transfusion, Iron, folate and B12
  - Diabetes
  - Nutrition
- Carbohydrate loading prior to surgery to reduce insulin resistance and dehydration
  - Solid foods up to 6 hours
  - Carbohydrate rich liquids up to 2 hours (Gatorade)
    - Reduces catabolic state

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Enhanced Recovery After Surgery (ERAS)

- Avoid use of NG tubes
  - Remove at end of surgery
  - Promotes return of GI function
  - Reduces fever, oral pharyngeal and pulmonary complications
- Prevents intraoperative hypothermia in abdominal surgery lasting more than 30 minutes
  - Warming devices and wrap

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Enhanced Recovery After Surgery (ERAS)

- Lighter anesthesia
  - NSAID (ibuprophen), Cox-2 inhibitor (celecoxib) and acetaminophen +/- gabapentin
  - Avoid/minimize use of opioids
- Early mobilization
  - Day of surgery
- Minimize/avoid intraoperative hydration
  - Early post-op fluids (1.5 liters/day)
- Avoid post-op hospitalization, if possible

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History & Physical
Cardiovascular Risk Factors

- History of stroke, angina, MI, CHF, diabetes or renal insufficiency
- History of VTE, immobility, and hormone therapy
- Use of hormone therapy or angiogenesis inhibitors (lenalidomide or bevacizumab)
- History cardiotoxic chemotherapy
  e.g. doxorubicin, 5-FU and cyclophosphamide

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History & Physical
Pulmonary Risk Factors

- Anemia, hypothermia, anesthesia & analgesics may lead to hypoxia & myocardial infarction
- Aspiration or postobstructive pneumonia risk increased with aerodigestive tract cancers
- Preoperative chemo-immunotherapy associated with pneumonitis i.e., neoadjuvant treatment
  - Bleomycin
  - MTX
  - alkylating agents
  - torso RT are associated with pneumonitis

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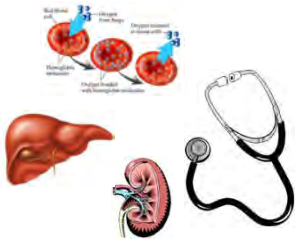
History & Physical
Hematologic Risk Factors

- Recent chemotherapy or RT
- Leukopenia
- Anemia
- Coagulopathy
- Malnutrition
- Liver and/or renal disease
- Bone marrow disease



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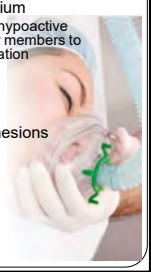
Post-Operative Complications
Surgical Stress Response

1. Fever
   - inflammatory response results in cytokine release lasting 1-3 days
2. Bleeding
3. Wound healing
4. Thrombus
5. Pulmonary complications
   e.g. aspiration and pneumonia

- 50% oncology patients experience post-op complications

5. Fluid imbalance
   - antidiuretic hormone affect salt and water metabolism lasting 3-5 days
6. Electrolyte imbalance
7. Postanesthetic delirium
   - For hyperactive or hypoactive delirium, use family members to assist with reorientation
8. Malnutrition
9. Scar tissue and adhesions



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Post-Operative Nursing Care

- Hemodynamic & cardiopulmonary stability
  - Vital signs, oxygen saturation, I&O, weight
- Pain management
- Pulmonary care to prevent pneumonia & atelectasis
  - Atelectasis is most common post-op respiratory complication
  - **Fever within 48 hr is indicator of atelectasis** ⚠
  - Pneumonia is most common hospital-acquired infection

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VTE Prophylaxis - Surgical Oncology

Drug	Trade Name	Regimen
Unfractionated heparin	Heparin	5000 units SC 2-4 hr pre-op then q8hr or 5000 units SC 10-12 hr pre-op then once daily
Enoxaparin	Lovonox	20 mg SC 2-4 hr or 10-12 hr pre-op then 40 mg daily
Dalteparin	Fragmin	2500 units SC 2-4 hr or 10-12 hr pre-op then 5000 units daily
Fondaparinux	Arixtra	2.5-10 mg SC Daily Start 6-8 hr post-op

VTEs ⚠
- Preventable morbidity - 50% are silent
- Accounts for 5-10% hospital deaths

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Post-Operative Nursing Care
Skin Integrity/Wound Healing

- **Primary intention** – clean wounds with closure using glue, staples or stitches
- **Secondary intention** – wounds requiring packing or wound vacuum system
- **Tertiary intention (delayed primary closure)** – intentionally delayed >2 days post-surgery due to wound contamination or unstable condition
  - Closed later with staples, glue or flap

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Post-Operative Nursing Care

- **Nutrition**
  - Moderate glycemic control (180–200 mg/dL)
  - Early initiation to promote wound healing, gut function and gut immune function
- **Bowel Function**
  - Affected by decompression, hydration, activity, narcotic and antiemetic use, diet, abdominal or pelvic surgery
- **Tubes or Drains**
  - Temporary or permanent
  - Site care
  - Active (JP drain) or passive system (Penrose)
  - Flushing and drainage

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Specialized Concerns

- Early ambulation
  - PT and OT (Exercise prescription)
- Lymphedema therapy
- Reproductive cryopreservation prior to surgery
- Ostomy care - ET nurse consult

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Lung Cancers

- Surgery alone NSCLC
  - Stage 1 & Stage 2
  - Select Stage 3
- Thoracotomy
- Thoracoscopy (VATS) with or without robotic assistance
- Minimally invasive surgeries improve safety, less pain, shorter hospital LOS, preserves pulmonary function, reduces inflammation and decreases atrial fibrillation

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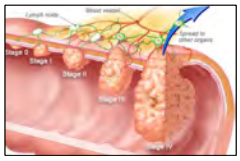
Colon Cancer



- Laparoscopic resection with or without robotic assistance
- Laparotomy
- 85% colon cancers surgically resectable
- 33% relapse with microscopic metastasis
- Adjuvant chemotherapy for stage 3
- Post-operative key points
  - continuation of antibiotics
  - risk poor healing, obstructions, perforation and/or tumor recurrence
  - Sexual dysfunction

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Rectal Cancer

- Endorectal ultrasound is most accurate staging method to determine need for neoadjuvant chemo or RT
- Stage 2 and 3 are large aggressive tumors
- Neoadjuvant chemo-radiation for Stage 3 or greater with lymph node involvement
- Intraoperative RT or brachytherapy for locally advanced
- Low anterior resection, adbominoperineal resection or proctectomy with coloanal anastamosis, possible colonic pouch or ileostomy

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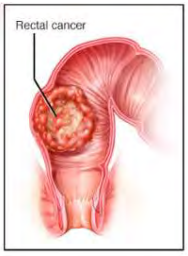
Rectal Cancer

- Sphincter preservation
  - Middle and upper third of rectum
- Lower tumors require permanent colostomy
- Post-op chemo or RT to improve quality of life



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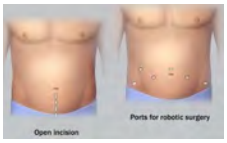
Prostate Cancer

- Radical prostatectomy
  - Prostate gland
  - Seminal vesicles
  - Vas deferens ampullae



- Open or robotic-assisted laparoscopic with nerve-sparing procedure
- Complications include incontinence and impotency

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Breast Cancer

- Lumpectomy followed by RT
  - Stage 1, 2b or T3 N1 M0
- Neoadjuvant chemo
  - Stage 3A N2, 3B or 3C
- Breast conservation surgery
  - Stage 1 or 2 depending on breast size and tumor dimensions
- Mastectomy with breast reconstruction
  - Patient choice
  - BRCA1 or BRCA2 mutations
- Sentinel node biopsy
- Excision tumor with adequate margins
  - Re-excision for positive margins
- Titanium clips at margins to guide RT

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Breast Reconstruction Options

- **Implant only is the most common form of reconstruction**
- Tissue expanders with implants later
- Latissimus dorsi alone or with implants
- Transverse rectus abdominis muscle (TRAM) flap
  - Contraindications include:
    - History of smoking
    - Obesity
    - Previous RT to surgical site
- Deep inferior epigastric flap (DIEP)
- Free flap from gluteal flap

FDA takes action to protect patients from risk of certain textured breast implants; requests Allergan voluntarily recall certain breast implants and tissue expanders from market

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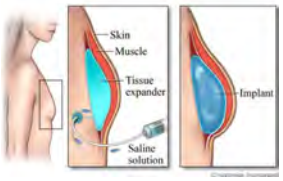
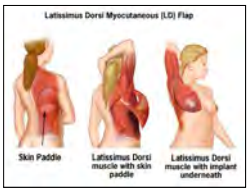
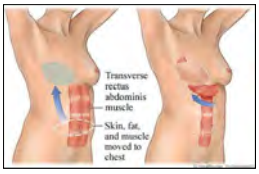
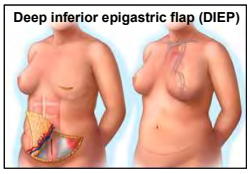
Breast Reconstruction Options









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Breast Cancer Surgery
Post-op Key Points

- Infection, seroma, and/or hematoma at the incision site
- Lymphedema
- Long-term "phantom" pain due to nerve destruction
- Loss of range of motion loss of arm and shoulder and chest wall tightness because of altered venous and lymphatic drainage
  - Early postoperative exercise program should begin within 24 hours and progress as tolerated
- Abdominal wall hernia or weakness
- Tissue necrosis due to loss of blood supply

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Breast Cancer Surgery
Post-operative Key Points

- Shaving under the arm with care
- Avoiding carrying heavy items
- Taking blood pressure on the non-operative side
- Administering IVs or injections on the non-operative side
- Avoid injury to skin on the affected side, including when trimming fingernails (no cutting of the cuticles)

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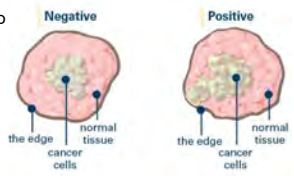
Surgical Limitations

1. Microscopic residual disease
2. Obtaining clean margins ("no ink") may require repeated excisions
   - Otherwise, risk of local recurrence doubles
3. Tumor invading nerves or vessels



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Question

The nurse is caring for a patient who has just returned from having a total laryngectomy. Your immediate postoperative priority is

A. pain management.
B. maintaining an effective airway.
C. maintaining effective communication.
D. providing adequate nutrition.

579

Question

A patient has returned from the OR having received a cystectomy with ileal conduit creation. The stoma appears pale. The first nursing action is

A. observe the stoma every 2 hours.
B. change the pouch.
C. notify the surgeon.
D. document the findings as "within normal limits."

580

Question

Which factors are the most important overall consideration for wound healing?

A. Recent transfusion, renal compromise or dialysis
B. Poor circulation, age, and immune response
C. Pain management, mobility, and timing of dressing changes
D. Depth of the wound, dehiscence, and potassium deficiency

581

Question

A patient reports peristomal erythema, excoriation, and bleeding with a colostomy. Which of the following complications should the nurse first suspect?

A. Anastomotic leak
B. Improper pouch fit
C. Allergy to stoma pouch adhesive
D. Colonic obstruction

582

Question

Following breast reconstruction surgery, a patient asks why she needs to have drainage tubes hanging out of the dressing. The nurse explains, drains are used to

A. allow for wound granulation.
B. infusion of antibiotics to the wound.
C. allow for silicone injection into the breast.
D. prevent the accumulation of fluid and blood.

583

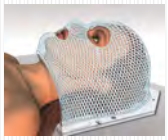
Question

The recommended unit of measurement for radiation therapy is

A. rem.
B. rad.
C. centigray.
D. curie.

586

Radiation Therapy



584

Treatment Modalities

Radiation Therapy

Local Treatment

- Goal – kill as many malignant cells as possible but minimize exposure to normal tissue
- Ionizing radiation directly and indirectly destroys cancer cells (breaks DNA strands)
- RT induces apoptosis

Synergistic Delivery Methods

- Can be combined with other modalities
  - Radiosensitizers e.g. Cisplatin, oxaliplatin, gemcitabine, fluorouracil, cetuximab, irinotecan, temozolomide, topotecan, and immunotherapy
  - Hyperthermia
  - Intraoperative delivery
- Toxicities increases when combined with chemotherapy or biotherapy protocols

Drapek, L. (2024). Radiation Therapy. In J. M., Brant, D. G. Cope & M. G. Saria (Eds). Core curriculum. (pp. 250-256).

587

Radiation Therapy

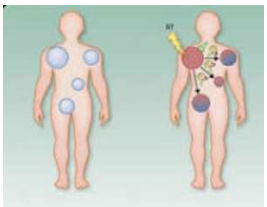
Delivery Methods

External beam - teletherapy	• Delivery of photons, protons, or electrons by a high-voltage machine
Internal radiation therapy – brachytherapy	• Radioactive material (iridium-192, cesium-137, Iodine-125) placed near cancer cells e.g., prostate seed implant, balloon RT, needles, applicators or catheter lumen
Systemic radiation therapy – targets an organ	•Capsule by mouth e.g. I-131 •Intravenous injection •Yittrium-90 (TheraSpere®) – liver metastasis •Radium-223 (Xofigo®) – bone metastasis •Lutetium 177 dodatate (Lutathera®) – neuroendocrine tumors •Lutetium 177 vipivotide tetraxetan (Pluvicto®) – prostate cancer

585

Immunotherapy and RT

Abscopal Effect



- Reduction in distant tumors sites when combining external beam RT with immunotherapy agents such as ipilimumab (anti-CTLA4 therapy)
- **Radiation seems to synergize with immunotherapy** via several mechanisms, such as increasing the visibility of tumor antigens, activating the cGAS-STING pathway, and modulating the tumor microenvironment

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5844965/

588

Treatment Modalities
Radiobiology Principles

- Normal tissue is affected by ionizing radiation
  - Targets DNA and cell environment
    - Direct effect to DNA
    - Indirect Effect – creates free radicals ($H_2O \rightarrow H^+ + HO$)
- Time in which biologic changes appear and effects occur depend on
  - Amount of radiation absorbed (Grays or centiGray -cGy)
  - Fractionation schedule
  - Rate of dose administered
- Acute and late effects depend on tissue involved, biologic effect and radiosensitivity of cells

Drapek, L. (2024). Radiation Therapy. In J. M., Brant, D. G. Cope & M. G. Saria (Eds). Core curriculum. (pp. 250-256).

589

Question

The nurse is teaching a patient diagnosed with early-stage Hodgkin disease about radiation therapy. Which of the following statements correctly describes the goal of treatment?

A. Curative RT is primary treatment aimed at killing all malignant cells.
B. Neoadjuvant RT is given before definitive treatment.
C. Adjuvant RT is given after definitive treatment to shrink the tumor.
D. Control RT is given to select high-risk areas to prevent future spread.

590

Five Rs of Radiobiology

Repair	• DNA repair of normal tissue
Reassortment	• Redistribution of cells into radiosensitive phase after a RT treatment
Repopulation	• Tumor cell proliferation
Reoxygenation	• Oxygenation of hypoxic cancer cells
Radiosensitivity	• Differences in cell metabolism, maturity and microenvironment

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591

Radiosensitive Tumor Cells

- Rapidly dividing cells are most sensitive to ionizing radiation

Highly
- Lymphoma/leukemia
- Germ cell tumors - ovarian or testicular

Fairly High
- Epithelial tumors – SCC ans adenocarcinoma
  - Head & neck, GI tract, skin, bladder, cervix, lung, etc.

Fairly Low
- Breast, salivary gland, hepatomas, renal, pancreatic, chondrosarcoma, osteogenic sarcoma

Low
- Rhabdomyosarcoma, Leiomyosarcoma and Ganglioneurofibrosarcoma

Drapek, L. (2024). Radiation Therapy. In J. M., Brant, D. G. Cope & M. G. Saria (Eds). Core curriculum. (pp. 250-256).

592

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593

RT Principles
Goals

- Curative or definitive – primary treatment for early-stage Hodgkin, lung or prostate cancers
- Neoadjuvant – prior to surgery e.g., esophageal or colon
- Adjuvant – after definitive surgery e.g., breast cancer
- Prophylaxis – preventive therapy e.g., small cell lung cancer or cranial for leukemia (CNS)
- Control – treatment for advanced cancers i.e., not curative
- Palliation – improve quality of live e.g., cord compression, superior vena cava syndrome, and brain metastasis

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594

Question

The most common radiation-induced secondary malignancy is

A. leukemia.
B. lymphoma.
C. sarcoma.
D. skin cancer.

595

RT Principles

RT course planned to deliver dose high enough to destroy tumor in primary site and lymph nodes but not exceed tolerance of normal tissues in RT field

Side effects result from radiation effects on normal tissue

1. **Early side effects**
   - Occur during RT and resolve after treatment
   - Mucosa, skin, GI, bone marrow
2. **Sub-acute effects**
   - Damage evident weeks to months after RT
   - Lung, liver, kidney, heart, spinal cord, and brain
3. **Late effects**
   - Months to years after RT are permanent
   - Lymph vessels, dermis, cartilage, bone, central & peripheral nerves

- Sarcoma is most common radiation-induced 2nd malignancy ⚠

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596

Radiation Therapy
Treatment Process

- Begins with RT consultation
- Radiation oncologist prescribes digital treatment plan based on disease, goal, other treatment modalities and patient condition
  - Delivery method
  - Dose
  - Frequency
- Treatment planning team includes medical physicist, dosimetrist, RT therapist, mold and cast technician, and RN
- Total dose is fractionated
  - Daily treatment (100-200 cGy)
  - Hyper fractionation 2x/day
  - Hypo fractionation – 1 large dose (total body radiation)
- CT Simulation ("mock") and digital planning system to precisely target RT field
  - MRI or PET may be required
- External markings or tattoo
- Masks or devices as immobilizers
- RT nurse coordinates and provides care prior, during, and post-treatment

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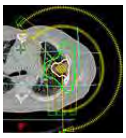
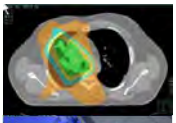
597

External Beam Radiation Therapy
Teletherapy



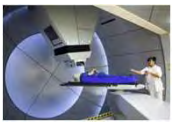

- **Intensity-Modulating RT (IMRT)**
  - Volumetric modulated arc therapy (VMAT)
  - Sculpted "beamlets" vary in shape & intensity
- **3-D Conformal Therapy (3DCRT)**
  - Six-field conformal prostate RT
  - Image-guided RT using protons
- **Image-guided RT (IGRT)**
  - Form of 3-Dimensional RT using CT scan
  - Spares normal tissues & organs by tracking changes in tumor position i.e., motion control
- **FLASH therapy**
  - Ultra-high dose RT
  - Shortened treatment doses
  - Avoids motion control and dose escalation

Drapek, L. (2024). Radiation Therapy. In J. M., Brant, D. G. Cope & M. G. Saria (Eds). Core curriculum.; Pierce, cited in Brant, et al., 2020

598

External Beam Radiation Therapy
Teletherapy





- **Stereotactic RT**
  - Combines robotic technology with external beam RT
    - Cyberknife
      - 1400 angles of treatment
      - 1 or 2-5 treatment sessions
    - Gamma Knife
      - 200 angles of treatment
      - For treatment of CNS tumors
      - limited to 1 session
- **Proton Beam Therapy**
  - Particles directed into tumor
  - Less energy delivered to normal tissues
  - May cause fewer side effects
  - Indicated for CNS, prostate, thyroid, liver, lung, melanomas, spinal, CNS tumors, and pediatric patients

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599

External Beam Radiation Therapy
Teletherapy

- Precise dose delivered from outside the body
- **Prescription includes**
  - Daily dose (fraction) and total dose
  - Specific instruction on beam delivery
  - Number of radiation fields and technology
- **Patient education**
  - Expectations of treatment
  - Side effects and self-care management
- **Weekly management evaluation**
  - *Status check or on-treatment visit (OTV)*
- **Long-term follow up**
  - Response to treatment
  - Monitor and manage late side effects

Drapek, L. (2024). Radiation Therapy. In J. M., Brant, D. G. Cope & M. G. Saria (Eds). Core curriculum.

600

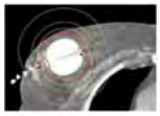
Internal Radiation Therapy
Sealed Sources - Brachytherapy

- Sealed sources
  - Seed implant – Prostate & CNS
  - Ribbons
  - Plaques
  - Rods
  - Balloon

Proseed®
palladium-103

GammaTile®
I-113

- Catheter source temporarily placed within or close to tumor



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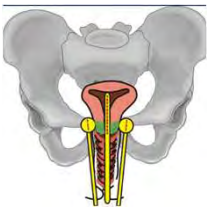
601

Brachytherapy
Tandem and Ovoid Applicator



- Applicators temporarily placed in body cavity for cervical and endometrial cancer
- Remote afterloading computers store and deliver dose (LDR/HDR)
  - High dose rate (HDR) radiation delivered over 10-20 min (wkly x 5)

602

Internal Radiation Therapy
Unsealed Sources - Radiopharmaceuticals

- Designed to target a specific organ or tumor cell

Source	Target	Half Life (Days)
Yttrium-90 microspheres (IR Dept.)	Liver mets	64.2
Iodine-131 capsule (oral)	Thyroid cancer	8
Strontium89-Metastron®	Prostate bone mets	50.52
Samarium153-Quadramet®	Prostate bone mets	1.93
Radium223–Xofigo®	Prostate bone mets	11.4
Lutetium177 dodatate - Lutathera®	GI Neuroendocrine	6.6
Lutetium 177 vipivotide tetraxetan - Pluvicto®	Prostate cancer	6.7

- Monitor CBC, renal, and hepatic function

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603

Question

When preparing a teaching plan for a client receiving radiopharmaceutical therapy, the nurse would convey

A. The principles of time, distance and shielding are not as critical.
B. It is only delivered intravenously or into a body cavity.
C. Safety regulations are less stringent than external radiation therapy.
D. It allow uptake of radioactive exposure at a pre-determined dose to a target organ.

604

Radiation Safety Principles
ALARA = As Low As Reasonably Achievable

- **Time –** Limit exposure
- **Distance –** radiation decreases in intensity with distance
  - exposure at a distance is the inverse of the square

Distance	2	3	4	5	6
Exposure	1/4	1/9	1/16	1/25	1/36

- **Shielding material –** thickness depends on energy source
  e.g. concrete, lead, steel or cast iron
- **Annual Occupational limit** - 50 mSv
- General public limit – 5 mSV

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605

Radiation Safety

1. Notice the risk.
2. Measure and monitor radiation exposure to healthcare workers by using a film badge, dosimeter or meter.

3. Measure radioactivity of environment (Geiger counter).

4. Never touch a source with bare hands.
   (use long-handled forceps for dislodged sources)

606

Side Effect	Early	Late	Nursing Care
Skin	Erythema (2-4 weeks into treatment) Pigmentation Dry desquamation Moist desquamation	Fibrosis Atrophy Altered pigmentation Slow healing Carcinogenesis	Radiation Dermatitis **EBP - Wash area with mild soap & water daily – Pat dry! Topical steroid to intact skin plus standard skin care.** Dry Desquamation (after 3 weeks) Moist Desquamation (after 4 weeks) **Wash area with mild soap & water – use hydrocolloid or silver leaf dressing** Underarm deodorant or antiperspirant Chemotherapy enhances reaction **(doxorubicin, dactinomycin)** Protect skin from sun, chemical and thermal irritation Avoid swimming in chlorinated pool

607

Side Effect	Early	Late	Nursing Care
Bone marrow	Leukopenia Thrombocytopenia	bone marrow aplasia	Monitor labs Monitor for infection or bleeding – use precautions
Spine		Paresthesias and sensory changes Decreased bone growth	Monitor pain and sensory changes Pain management
Brain	Alopecia Headache Increased ICP Seizures Somnolence	Erythema Hypothyroidism [if pituitary in field] Cognitive changes Myelopathy Necrosis of brain tissue due to blood vessel injury	***Early:*** use mild shampoo Use skin moisturizer Monitor for AMS, ICP, and seizure

610

Side Effect	Early	Late	Nursing Care
Head & Neck	Xerostomia Change in taste Laryngitis	Pale mucosa Telangiectasis  Xerostomia Dental caries	Pretreatment dental evaluation Oral protocol with saline or bicarbonate rinses & Soft toothbrush Fluoride dental therapy Soft or pureed diet Oral supplements gastrostomy tube feeds prn Avoid chemical, thermal & mechanical injury
Chest Wall	RT pneumonitis	Pulmonary fibrosis Cardiomyopathy/ MI	Assess breathing & cardiac function

608

Side Effect	Early	Late	Nursing Care
Ovaries Testes Vagina Penis	Premature menopause Inflammation Dryness Dysparunia	Ovarian failure Sexual dysfunction Azoospermia Dryness Stenosis Vaginal shortening Dysparunia Erectile dysfunction Urethral stenosis Shrinkage and loss of sensation	Fertility counseling prior to RT Sexuality counseling Sperm banking prior to RT Sitz bathes Water-based lubricants Vaginal dilators Assess prior to RT Sexuality counseling
All sites	Fatigue	Fatigue Carcinogenesis	Promote exercise Survivorship care

611

Side Effect	Early	Late	Nursing Care
Abdomen Stomach	Enteritis diarrhea Fat malabsorption Nausea & vomiting	Small bowel obstruction Stricture Necrosis	loperimide (Imodium) diphenoxylate/Atropine (Lomotil) Low-residue diet Hydration antiemetics
Pelvis Rectum	Cystitis Diarrhea, N&V Inflamed Hemorrhoids	Fibrosis Bowel ulceration Inflammation	Assess bladder function Bladder analgesics Antidiarrheal meds Sitz bathes Hemorrhoid therapy

609

Question

R.J. is undergoing pelvic radiation for colorectal cancer. He might experience which of the following secondary side effects?

A. Hypokalemia
B. Hypocalcemia
C. Hyperphosphatemia
D. Hypermagnesemia

612

Question

A nurse is standing six feet away from a patient who has received I-131 therapy. The dose of radiation exposure to the nurse is

A. 1/6.
B. 1/36.
C. 1/16.
D. 1/2.

613

Question

The delivery of radiation in divided doses allows for

A. maximum absorption as a radiopharmaceutical.
B. therapeutic and trusting relationship with radiation therapy professionals.
C. recovery of surrounding normal tissue.
D. optimal deoxygenation of malignant cells.

614

Question

Which therapy technology delivers an ultra-high dose of radiation, shortening treatment time and avoids motion control?

A. Flash radiation therapy
B. Intraoperative radiation therapy.
C. Image guided radiation therapy.
D. stereotactic radiation therapy.

615

Question

When preparing a teaching plan for a patient receiving external beam radiation therapy to the chest wall, the nurse instructs the patient to apply

A. aloe vera lotion.
B. topical steroid.
C. antibacterial soap.
D. hydrogel.

616

Question

Dry desquamation due to radiation therapy is

A. prevented by washing with hot water and a mild soap.
B. characterized by weeping skin.
C. described as scaly skin.
D. characterized by generalized skin redness.

617

Question

Chronic radiation side effects differ from acute in that chronic

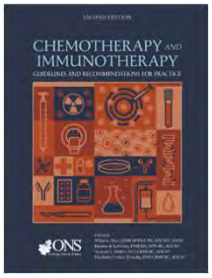
A. is always reversible within 1-2 years.
B. is predictable and occur during treatment.
C. occurs in rapidly dividing tissues such as bone marrow.
D. occurs in weeks to months after radiation therapy.

618

Chemotherapy

619

Resources



https://www.fda.gov/drugs/resources-information-approved-drugs/hematologyoncology-cancer-approvals-safety-notifications

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Chemotherapy Principles

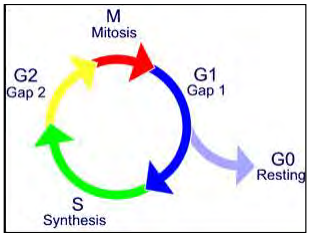
Cellular kinetics or cell cycle phases

- **Cell cycle time:** Amount of time from one cell mitosis to another
  - Varies with cell type
  - Continuous chemotherapy infusions provide greater cell kill in cells with short cell cycle times, especially with cycle-specific drugs e.g. cytarabine and fluorouracil
- **Growth fraction:** Percentage of cells dividing at any given point
  - Tumors with high growth fraction result in higher cell kill using cell cycle-specific drugs
  - Tumors with cells in G0 resting phase are sensitive to cell cycle non-specific drugs
- **Tumor burden:** Volume of cells
  - As tumors grow the burden increases, the growth rate slows down
  - Higher burden results in tumor heterogeneity and drug-resistant clones

621

Cell Cycle

- G0 phase (resting)
  - A few hours to years
- G1 phase
  - 8-30 hrs.
- S phase
  - 18-20 hr.
- G2 Phase
  - 2-10 hr.
- M (mitosis) phase
  - 30-60 min.



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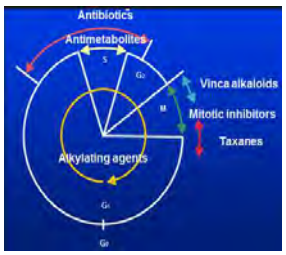
Question

Cell cycle non-specific agents differ from cell cycle specific agents in that they

A. are only given orally.
B. are schedule dependent and most effective if administered in divided doses.
C. exert major cytotoxic effects in all phases of the cell cycle.
D. require cumulative dose tracking.

623

Chemotherapy Classifications



Cell Cycle Non-Specific [CCNS]

- Exert effects in **all phases**
- Given to patients with slowly dividing tumors
- Breaks DNA helix strand, thereby interfering with DNA replication
- Intermittent schedule (bolus doses)

e.g. Alkylating agents, hormones, nitrosureas

Cell Cycle Specific [CCS]

- Exert effect in a **specific phase**
- Given frequently in divided doses over multiple days or continuous infusion

e.g. S Phase – antimetabolites & anti-tumor antibiotics, M Phase - Plant alkaloids & Taxanes, etc.

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Chemotherapy Principles

- Maximum cell kill within dose limits
- Repeat cycle after hematologic recovery
  - 10-14 days
- Combination vs. single agent therapy
  - Super-additive effect
  - Increases cell kill
  - Reduces drug- and cross-resistance
- Avoid interruptions or dose reductions
- Sequencing of agents
  e.g. drug A followed by drug B
- Dose dense therapy
  - Dose per unit of time
  - q2 weeks vs. q3 weeks
  - Diminishes tumor regrowth
- Dose intensity
  - amount of drug over time
  - use growth factors
- Relative dose intensity
  - Actual percentage of dose received
  - Proactively manage symptoms
  - Educate patient to stay on schedule

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Question

Chemotherapy is frequently administered in drug combinations because it may allow for

A. less damage to cells.
B. decreased side effects.
C. overcoming drug resistance.
D. higher doses of therapy.

626

Treatment Plan
Selection

- Tumor cell type & grade
- Stage of disease
- Goal of therapy
  - Cure
  - Control
  - Palliation
- General condition of patient
  - Comorbidities
  - Performance status
  - Prior surgery, chemotherapy and/or RT
- Drug sensitivity
  - protocol driven

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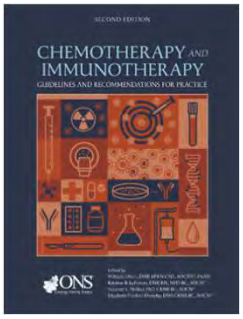
Also Review...

Vesicants
&
Irritants



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Question

Which of the following agents is considered a vesicant?

A. cyclophosphamide
B. fluorouracil
C. methotrexate
D. doxorubicin

629

Vesicant Agents

Anthracyclines Doxorubicin Daunorubicin Idarubicin Epirubicin	**Taxanes (mild vesicant)** Paclitaxel Docetaxel Paclitaxel albumin-bound Cabazitaxel
Antitumor Antibiotic Mitomycin C Dactinomycin Liposomal doxorubicin and cytarabine	**Anthracenedione** Mitoxantrone
Plant Alkaloids Vincristine Vinblastine Vindesine Vinorelbine	**Alkylating Agent** Trabectedin Lurbinectedin

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Monitor for burning, stinging, redness and change in blood return

630

Question

Which of the following agents is considered an irritant?

A. arsenic trioxide
B. oxaliplatin
C. vincristine
D. cyclophosphamide

631

Irritant Agents

Alkylating Agents Melphalan Oxaliplatin Carboplatin Cisplatin Bendamustine hydrochloride Carmustine Dacarbazine Ifosfamide	**Plant Alkaloids** Irinotecan Topotecan	**HER-2 Inhibitor** Ado-trastuzumab
Antitumor Antibiotic Bleomycin	**Antimetabolite** Fluorouracil Gemcitabine	**Toipimerase Inhibitor** Etoposide
Immunotherapy- Monoclonal Antibody Therapy Rituximab Enfortumab vedotin-ejtv Loncastuximab tesirine-lpyl • May cause local allergic reaction	**Immunotherapy - Checkpoint Inhibitors** Ipilimumab Nivolumab Pembrolizumab • irritant potential and may cause thrombophlebitis	**Immunotherapy– Targeted Agent** Carfilzomib

- Cold pack 15-20 minutes/day QID first 24 hours
  - Exception: oxaliplatin and vinorelbine use warm pack for 24-48 hours
  - Oxaliplatin add dexamethasone 8 mg. BID for up to 14 days

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Monitor for aching, tightness along vein, redness or darkness
Blood return will be present

632

Question

Which of the following interventions is recommended for a patient receiving doxorubicin who experiences pruritus and a wheal at the peripheral intravenous site?

A. hyaluronidase
B. cold pack
C. dexrazoxane
D. hydrocortisone

633

Flare Reaction

- Local reaction of peripheral vein
  - Pruritus and urticaria
  - Blood return present
- Associated with anthracycline e.g. doxorubicin
  - Due to histamine release
- Management
  - Verify blood return
  - Flush with saline and observe for resolution
    - Usually takes 45 minutes
  - Antihistamine
    - Premedicate with subsequent cycles
- Do not resume infusion until reaction resolved
- Consider starting new IV site

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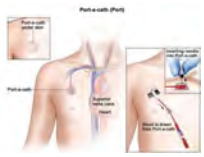
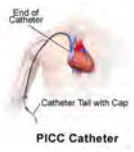
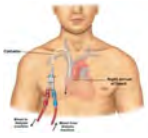
Vascular Access Devices (VADs)

- Peripheral
- Midline
- Port
- PICCS
- Tunneled central line
  - Apheresis catheter
- Arterial catheter







635

Vascular Access Devices (VADs) Complications

- **Infection**
  - Strict aseptic technique
  - Bundle care
    - Hand hygiene before & after use
    - Maximal barrier precautions on insertion of device
    - "Scrub the Hub" with chlorhexidene-alcohol
    - Use alcohol caps
- **Occlusions**
  - Thrombosis
  - Fibrin sheath within 24 hrs to 2 weeks
  - DVT occluding the vein
  - Medications, TPN or lipids

636

Vascular Access Device (VAD)
Complications

- Phlebitis
- Extravasations
- Dislodgment
- Skin erosion
- Fracture or cuts
- Port separation from catheter
- Catheter migration
- Air embolism
- Pneumothorax
- Mechanical Occlusion
  - Collapse of lumen from negative pressure
  - Catheter abuts vein wall
  - Pinch-off syndrome

637

Question

S.J. has a port in place and arrives in the infusion suite for chemotherapy. Upon accessing the port, the nurse has difficulty obtaining a blood return. This problem is likely due to

A. excessive pressure when flushing the catheter.
B. use of normal saline to lock the device.
C. lack of a push-pause technique when flushing the device.
D. blood component therapy.

638

Question

A.C. is to receive intravenous chemotherapy. The nurse ensures safety by performing and documenting assessments

A. every hour after the start.
B. before, during, and after administration.
C. after administration.
D. prior to administration.

639

Chemotherapy
Routes of Administration

- Oral
- SQ or IM
- Intravenous
- Regional chemotherapy
  - Intra-arterial
  - Intravesicular (bladder)
  - intraocular
  - Intrapleural
  - Intrathecal
    - Warning - vinca alkaloids fatal due to neurotoxicity
  - Intraperitoneal
    - Hyperthermic intraperitoneal chemotherapy (HIPEC)
    - Pressurized intraperitoneal aerosolized chemotherapy (PIPAC)

M., Olsen et al., 2023

640

Question

A known side effect of alkylating agents includes

A. subsequent malignancies.
B. peripheral neuropathies.
C. QT interval prolongation.
D. coagulopathy.

641

Question

Mr. P. is receiving cisplatin. Which toxicity is most important for him to report?

A. alopecia
B. nail bed changes
C. tinnitus
D. fatigue

642

Alkylating Agents (CCNS)

DRUG	SIDE EFFECTS
Cisplatin Oxaliplatin Carboplatin Bendamustine hydrochloride	Ototoxicity & renal toxicity Cold neuropathy Hypersensitivity reaction (7th dose)
Cyclophosphamide Ifosfamide	Hemorrhagic cystitis – use Mesna
Melphalan	Pulmonary fibrosis
Treosulfan	Hepatic and renal toxicity
Bendamustine	Flu-like symptoms
Busulfan	Seizures (high dose)
Thiotepa	Skin desquamation Frequent showers q6hr x 48 hr Avoid tape x 48 hr
Temozolomide Trabectedin	Bone marrow depression Cardiomyopathy

Myelosuppression
Nausea and vomiting
Gonadal dysfunction
Subsequent malignancy

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643

Question

Patients receiving premetrexed require the administration of

A. an antiemetic.
B. stool softener.
C. growth factors.
D. folic acid.

644

Antimetabolites – Antifolates (CCS)

DRUG	SIDE EFFECTS
Methotrexate	Renal toxicity High dose – requires leucovorin rescue Maintain urine pH greater than 7
Premetrexed Pralatrexate	Skin rash Administer folic acid, steroids & vitamin B_{12} - reduces hematologic & GI toxicity

Myelosuppression
Nausea and vomiting
Stomatitis
Diarrhea
Hepatotoxicity
Renal toxicity

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645

Question

Capecitabine exhibits toxicities like

A. vinblastine.
B. doxorubicin.
C. fluorouracil.
D. paclitaxel.

646

5-Fluoropyrimidines (CCS)

DRUG	SIDE EFFECTS
Fluorouracil	Angina Hand Foot Syndrome
Capecitabine	Hand Foot Syndrome
Floxuridine - hepatic arterial pump	Gastritis Enteritis Hepatotoxicity

Myelosuppression
Nausea and vomiting
Stomatitis
Diarrhea
Hepatotoxicity

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Cytidine Analogues (CCS)

DRUG	SIDE EFFECTS
Azacitidine Decitabine Decitabine and cedazuridine Clofarabine	CHF Tumor lysis syndrome
Cytarabine Cytarabine liposomal Nelarabine	Cerebellar toxicity High dose - conjunctivitis (use steroid eye drops)
Fludarabine	Tumor lysis syndrome
Gemcitabine	Pulmonary toxicity

Myelosuppression
Nausea and vomiting
Stomatitis
Diarrhea
Hepatotoxicity
Neurotoxicity

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648

Question

Life-time cumulative dose tracking is required for

A. vinblastine.
B. doxorubicin.
C. fluorouracil.
D. paclitaxel.

649

Anthracyclines (CCS) & Antitumor Antibiotics

DRUG	SIDE EFFECTS
Doxorubicin Daunorubicin	Lifetime cumulative dose Radiation recall Red urine
Daunorubicin and cytarabine liposomal	Copper overload
Doxorubicin Liposomal	Hand foot syndrome (PPE)
Epirubicin Idarubicin	Red urine
Mitoxantrone	Blue urine and sclera
Actinomycin Valurubicin	Intravesicular use
Bleomycin	Pulmonary fibrosis

Cardiopulmonary toxicity
Myelosuppression
Vesicant

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650

Question

Discharge medication for a patient treated with vincristine should include a(n)

A. muscle relaxant.
B. antidepressant agent.
C. anti-diarrheal agent.
D. stool softener and laxative.

651

Antimicrotubule Agents (CCS)

DRUG	SIDE EFFECTS
Vincristine (cap dose 2 mg) Vincristine Liposomal Vinblastine Vinorelbine Vindesine	FATAL IF GIVEN INTRATHECAL ROUTE VESICANT Constipation
Paclitaxel Docetaxel Albumin-bound paclitaxel Cabazitaxel	Anaphylactic reactions (premeds required) Myalgia
Ixabepilone Eribulin	QT interval prolongation

Myelosuppression
Peripheral neuropathy
Hypersensitivity reactions

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652

Question

Which of the following agents is associated with late onset diarrhea?

A. vincristine
B. irinotecan
C. daunorubicin
D. cisplatin

653

Topoisomerase Inhibitors (CCS)

DRUG	SIDE EFFECTS
Irinotecan Irinotecan liposomal Topotecan	Diarrhea (early & late) • Atropine- early onset • Imodium - late onset
Etoposide Teniposide	Hypotension - infuse over 60 min

Myelosuppression
Peripheral neuropathy
Hypersensitivity reactions

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Question

Arsenic trioxide requires periodic monitor with

A. MUGA scan.
B. ECG.
C. CT scan.
D. Cardiac MRI.

655

Miscellaneous (CCNS)

DRUG	SIDE EFFECTS
Asparaginase Asparaginase Erwinia Pegasparaginse	Anaphylactic reactions (premeds required) Hepatotoxicity Coagulopathy Pancreatitis
Arsenic Trioxide	QT interval prolongation Electrolyte imbalance
Tretinoin	Cough & dyspnea, fever, pulmonary infiltrates • retinoic acid syndrome
Procarbazine	CNS depression Myelosuppression Stomatitis diarrhea
Hydroxyurea	Myelosuppression Mucositis Secondary malignancy
Romidepsin Vorinostat	Myelosuppression QTc prolongation
Omacetaxine Vorinostat	Myelosuppression Hyperglycemia

Olsen, M., et al., 2023

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Question

Which agent crosses the blood-brain barrier?

A. Carmustine
B. Paclitaxel
C. Etoposide
D. Bleomycin

657

Nitrosoureas (CCNS)

DRUG	SIDE EFFECTS
Carmustine	Pulmonary fibrosis
Lomustine - oral	As above Administer on empty stomach
Streptozocin	Renal toxicity Bone marrow depression Hypoglycemia

Prolonged marrow suppression
Nausea and vomiting
Renal toxicity

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658

Question

Cancers treated with endocrine therapy include

A. pancreatic and breast.
B. renal and adrenal.
C. breast and prostate.
D. ovarian and testicular.

659

Hormone Therapy Classification

Side Effect education: hot flashes, joint pain, myalgias and/or arthralgia, flare reaction

Breast Cancer

- **Nonsteroidal aromatase Inhibitors**
  - Anastrozole
- **Steroidal Aromatase Inactivator**
  - Exemestane
- **Selective Estrogen Receptor Downregulator (SERD)**
  - **Fulvestrant**
    - **HR-positive and HER2-negative advanced breast cancer only**
- **Nonsteroidal Selective Aromatase Inhibitor**
  - Letrozole
- **Antiestrogen**
  - Tamoxifen
  - Toremifene

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Hormone Therapy Classification

Side Effect education: hot flashes, joint pain, myalgias and/or arthralgia

Prostate Cancer

- **Antiandrogens – Target Androgen Receptor**
  - Apalutamide
  - Bicalutamide – does not cross blood brain barrier
  - Enzalutamide
  - Flutamide
  - Nilutamide
  - Darolutamide – does not cross blood brain barrier
- **CYP17 Inhibitors**
  - Abiraterone
  - Ketoconazole

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Hormone Therapy Classification

Side Effect education: hot flashes, joint pain, myalgias and/or arthralgia and flare reaction with LHRH agents

Prostate Cancer

- **Luteinizing Hormone-releasing Hormone (LHRH) antagonist**
  - Degarlix
  - Relugolix
- **Luteinizing Hormone-releasing Hormone (LHRH) agonists**
  - Triptorelin

Breast or Prostate Cancer

- **Luteinizing Hormone-releasing Hormone (LHRH) agonists**
  - Leuprolide
  - Goserelin acetate

Adrenal Cancer

- **Adrenolytic**
  - Mitotane

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Corticosteroids

- Inhibit lymphocyte production and function
- Effective in leukemia, myeloma, lymphoma treatment

Examples:

- Hydrocortisone
- Prednisolone
- Dexamethasone
- Methylprednisolone

- Side Effects: infection, hyperglycemia, psychosis, fluid retention, avascular necrosis, myopathy, osteoporosis

663

Question

Which of the following is considered a chemoprotective agent?

A. Erythropoietin
B. Palonosetron
C. Filgrastim
D. Dexrazoxane

664

Question

A patient is receiving high-dose methotrexate. The nurse knows to ask the patient to

A. restrict oral intake.
B. provide a urine sample to check the alkalinity.
C. write a sentence.
D. provide a blood specimen to check for drug level.

665

Chemoprotective Agents

Dexrazoxane
- Cardioprotective
- Use with anthracyclines

Amifostine
- Renal protectant
- Mucositis prevention (HSCT only)

Mesna
- Bladder protectant
- Prevents hemorrhagic cystitis
- Use with Ifosfamide or cyclophosphamide

Leucovorin
- Rescues normal cells from methotrexate (high dose) or impaired renal excretion

M. Olsen, et al., 2023

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Question

A patient is receiving high-dose cytarabine. The nurse knows to ask the patient to

A. restrict oral intake.
B. provide a urine sample to check the acidity.
C. perform a finger-to-nose test.
D. provide a blood specimen to check for drug level.

667

Chemotherapy Antidotes

- Uridine triacetate
  - Indicated for early-onset, severe or light-threatening 5-FU or capecitabine symptoms or overdose
  - Must start within 96 hours following the end of 5-FU or capecitabine
  - 10g orally q6hr x 20 doses
  - Inhibits cell damage and cell death caused by fluorouracil
- Glucarpidase
  - Delayed methotrexate clearance due to renal impairment or acute kidney injury (AKI)
  - Rapidly converts methotrexate to glutamate

M. Olsen, et al., 2023

668

Question

A patient receiving cisplatin calls the nurse because the intravenous tubing is leaking. The nurse should first

A. check for a blood return.
B. remove the patient from the room.
C. call the pharmacist for a new bag of cisplatin.
D. locate a spill kit and cordon off the area.

669

Question

Jose is receiving ifosfamide today. The nurse reviews the treatment plan to ensure it includes:

A. leucovorin.
B. amifostine.
C. mesna.
D. dexraxozane.

670

Precision Medicine

Biotherapy
Immunotherapy
Targeted Therapy

671

Question

Which of the following agents are classified as major types of immunotherapies?

A. Tyrosine kinase inhibitors and epidermal growth factors receptor agents
B. Checkpoint inhibitors and tyrosine kinase inhibitors
C. Monoclonal antibodies, adoptive cellular transfer therapy and vaccines
D. Monoclonal antibodies and tyrosine kinase inhibitors

672

Question

Which hematopoietic growth factor is a multi-lineage growth factor?

A. Pegfilgrastim
B. Darbepoetin
C. Oprelvekin
D. Sargramostim

673

Cytokine Growth Factor	Action
Granulocyte (G-CSF) filgrastim filgrastim-sndz (Zarxio®-Sandoz) filgrastim-ayow (Releuko®) Filgrastim-aafi (Nevestym®) TBO-filgrastrim (Granix® - Teva)	Neutrophils
pegfilgrastim pegfilgrastim-jmdb (Fulphilia®) pegfilgrastim-cbqv (Udenyca®) pegfilgrastim-apgf (Nyvepria ™) pegfilgrastim-pbbk (Fylnetra®) pegfilgrastim-bmez (Ziextenzo®)	
Granulocyte Macrophage (GM-CSF) sargramostim (Leukine®)	Neutrophils Macrophages IL-1 Tumor necrosis factor (TNF)
EPO-CSF epoetin alfa darbepoetin epoetin alfa-epbx [redacted]	RBC **Avoid use in uncontrolled hypertension**
oprelvekin (Neumega®) – IL-11	Megakaryocytes (platelets)

Bone pain
Injection site pain
Fever

Olsen, M., et al., 2023

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Immunotherapy
Biotherapy

Cytokine Therapy

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Cytokine Therapy
Interferon

- INFalfa-2b (Intron A)
- INF gamma (Actimmune)

- Action:
  - Anti-viral and antitumor
    - Antiproliferative
    - Immunomodulatory

- Side Effects: injection site pain, fever, chills, headache, N/V, diarrhea, myelosuppression, fatigue, and depression
  - INFalfa-2b (Intron A) – homicidal or suicidal ideation

M. Olsen, et al., 2023

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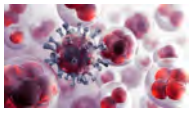
Cytokine Therapy
Interleukin



- Aldesleukin – IL-2
- Action: Stimulate activation of immune cells
  - T- and B-cells
  - NK cells
  - LAK cells
  - Tumor-infiltrating lymphocytes
- Side Effects: fever, chills, headache, N/V, diarrhea, myelosuppression, life-threatening cardiac arrhythmias, respiratory failure, and capillary leak syndrome
- Steroids – contraindicated (blocks immune system)

Olsen, M., et al., 2023

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Immunotherapy
Vaccines

- Conditions patient's own immune system to recognize and respond to antigens
- Active-specific immunotherapy (ASI) – attacks existing cancer cells by targeting tumor-associated antigens (TAA)
  - Dendritic autologous cell-based
    - Sipuleucel-T: for select metastatic prostate cancer patients
  - Oncolytic viral Immunotherapy
    - nadofaragene firadenovec-vncg
      - Non-invasive bladder cancer after BCG therapy
    - taligmogene laherparepvec
      - select inoperable or recurrent metastatic melanoma

Olsen, M. et al., 2023

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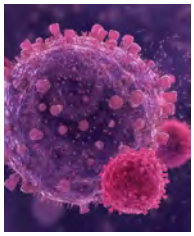
Cellular Immunotherapy
Immune Effector Cell Therapy

- Adoptive cell therapy
- Precise immune-mediated antigen-directed therapy against cancer cells
- Four distinct types
  - Viral-specific T-cells (T-VEC)
  - Chimeric antigen receptor T-cell-infiltrating lymphocytes (CAR-T)
  - Genetically Modified T-cell receptors (GMO-TCR)
  - Tumor Infiltrating Lymphocytes (TIL)



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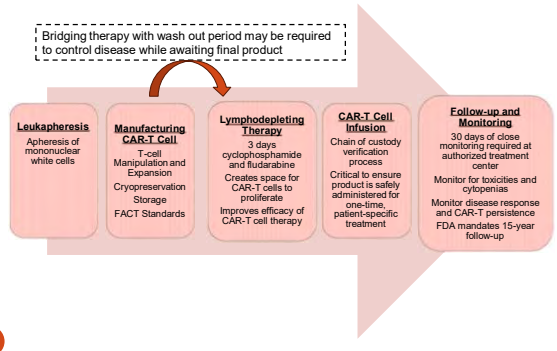
CAR-T Cell Therapy
5-Step Process



682

682

Question

A.T. is a 52-year-old male undergoing treatment for relapsed lymphoma. The nurse explains to A.T. that the goal of chimeric antigen receptor T-cell therapy is to

A. initiate and sustain an immune response.
B. trap cancer cells in the lymph nodes.
C. deplete lymphocytes.
D. proliferate and activate neutrophils.

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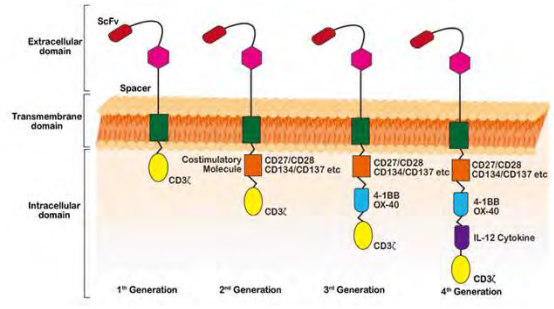
CAR-T Cell Development



Bashar, S.B. et al., (2022). *CAR T Cell Immunotherapy That Revolutionary Breakthrough in Human Oncology Treatment: A Review.* Pharmacology & Pharmacy, 13, 483-515. https://doi.org/10.4236/pp.2022.1311036

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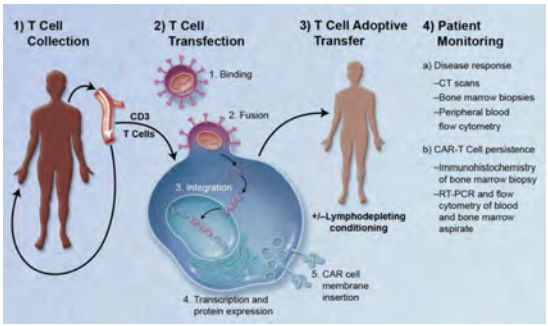
Immunotherapy
Chimeric Antigen Receptor T-cell (CAR-T) Therapy Process



Lymphomation.org

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FDA-approved CAR-T Cell Therapy

Antigen Target	FDA-approved	Indication	Significant Adverse Effects
CD-19	Axicabtagene ciloleucel	Relapsed or refractory DLBC lymphoma	Cytokine release syndrome (CRS) Immune Effector Cell-associated Neurotoxicity Syndrome (ICANS)
CD-19	Tisagenlecleucel	Relapsed Pediatric ALL (up to age 25) R/R DLBC Lymphoma	
CD-19	Lisocabtagene maraleucel	R/R DLBC Lymphoma Relapsed Follicular lLmphoma	
CD-19	Brexucabtagene autoleucel	Relapsed refractory mantle Cell Lymphoma	
B-cell Maturation Antigen (BCMA)	Idecabtagene vicleucel	Relapsed refractory multiple myeloma	
BCMA	Ciltacabtagene autoleucel	Relapsed refractory multiple myeloma	

Olsen, M. et al., 2023; FDA, 2022

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Cellular Product	FDA-approved	Indication	Adverse Effects	Additional Requirements
Autologous tumor infiltrating lymphocyte (TIL)	lifileucel lifi-cel	Adult unresectable or metastatic melanoma after treatment with PD-1 blocking antibody and if applicable, BRAF or MEK inhibitors	Severe cytopenias Cardiopulmonary and renal impairment Internal hemorrhage	Interleukin infusion up to 6 doses after TIL cell infusion
CD-19 autologous CAR-T	obecabtagene autoleucel obe-cel	Relapsed/refractory B-cell ALL	CRS and neurotoxicity Subsequent T-cell malignancies	Split dose infusion Day 1 and Day 10 (=/- 2 days) Dose dependent on bone marrow blast count prior to lymphodepleting therapy
Autologous gene edited HPC-based therapy	exagamglogene autotemcel exa-cel	Sickle cell disease (age 12-years and older) with recurrent veno occlusive crisis	Cytopenias Off-target genome editing risk CD34+ cells	Plerixafor only for apheresis mobilization of CD34+ cells Myeloablative conditioning chemotherapy
T cell receptor (TCR) autologous gene modified	afamitresgene autoleucel	Metastatic synovial sarcoma or melanoma-associated intracellular antigen MAGE-A4	CRS and neurotoxicity	Specific to tumor cells expressing HLA- A: *02:01P, *02:02P and *02:03P and *02:06P
Autologous HPC gene modified	betibeglogene autotemcel	Adult and pediatric ß-thalassemia	Delayed engraftment Insertional oncogenesis	Myeloablative conditioning chemotherapy

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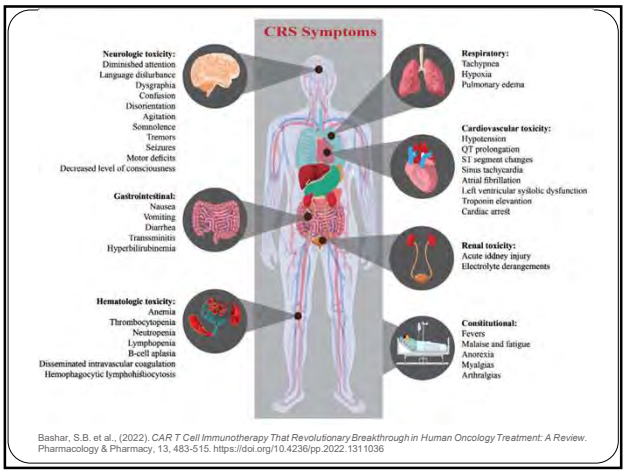

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CAR-T Cell Therapy
Follow-up and Monitoring

Laboratory monitoring

C-reactive protein (CRP)
Ferritin
CBC with differential
Toxicity assessment
- Cytokine-release syndrome
- Neurotoxicity

Late Effects

B-cell aplasia
- Hypogammaglobinemia

Risk of subsequent cancers
Neurologic disorders
Autoimmune disorders
Reproductive toxicities
Late infectious complications
Survivorship

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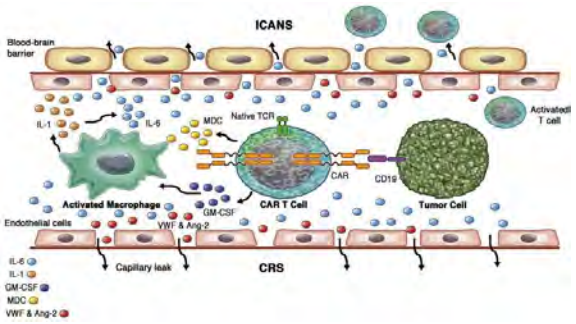
Proposed Mechanism
CRS and ICANS



Freyer, C. W., Porter, D., L. 2020 https://www.jacionline.org/action/showPdf?pii=S0091-6749%2820%2931099-X

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Question

E.W. received axicabtagene ciloleucel four days ago. She continues to be febrile since the day of infusion. All cultures are negative. The nurse can expect orders for

A. tocilizumab.
B. dexamethasone.
C. caspofungin.
D. ceftazidime.

690

Question

On day 7, E.W. is unable to speak and write a sentence on paper. The nurse can expect orders for

A. tocilizumab.
B. dexamethasone.
C. caspofungin.
D. ceftazidime.

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CAR-T Cell Therapy Adverse Effects

Immune Effector Cell-Associated Syndrome (ICANS)

ICANS

Grade	ICE score	Conciousness	Weakness	Seizures	Edema
1	7-9	depressed level of consciousness but awakens spontaneously	No motor weakness	No seizures	No raised ICP or cerebral edema
2	3-6	depressed level of consciousness but awakens to voice	No motor weakness	No seizures	No raised ICP or cerebral edema
3	0-2	depressed level of consciousness but awakens to tactile stimulus	No motor weakness	Any focal/generalized/ nonconvulsive seizures that rapidly resolve	Focal/local edema on neuroimaging
4	0 and unarousable	requires vigorous or repetitive tactile stimuli to arouse or stupor or coma	Deep focal motor weakness (hemiparesis, paraparesis)	Repetitive or life-threatening prolonged seizure (>5 min)	Clinical signs or imaging findings consistent with diffuse cerebral edema

COMPLICATION	FREQUENCY	TREATMENT OPTIONS
CRS	37% - 93%	Tocilizumab if no response to tocilizumab glucocorticoids
ICANS	23% - 67%	Glucocorticoids
Sepsis	8% - 16%	Empiric antibiotic therapy
B-cell aplasia/hypogammglobulinemia	56% - 88%	Intravenous immunoglobulins

Abbreviations: CRS, cytokine release syndrome; ICANS, immune effector cell-associated neurotoxicity syndrome.

Shimabukuro-Vornhagen, A. et al., (2021). *Critical Care Management of Chimeric Antigen Receptor Therapy Recipients.* CA Cancer J Clin 2021;0:1–16. doi: 10.3322/caac.21702.

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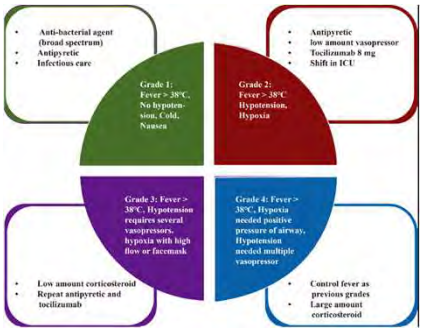
CAR-T Cell Therapy Adverse Effects

CRS Grading and Management



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Pediatric Oncology
CAR-T Cell Therapy Survivor

- Emily Whitehead
- Diagnosed with resistant form of pediatric ALL
- Underwent CAR-T cell therapy at Children's Hospital of Philadelphia in 2011
  - PICU admission for severe (life-threatening) CRS
  - Treated with tocilizumab
- Remains in remission today!

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CAR-T Cell Therapy Adverse Effects

Immune Effector Cell Encephalopathy (ICE) Score

ICE Score				
Orientation: oriented to year, month, city, hospital: 1 point each, 4 points total				
Naming: ability to name 3 objects: 1 point each, 3 points total				
Follow commands: able to follow simple command, 1 point total				
Writing: able to write a standard sentence, 1 point total				
Attention: able to count backwards from 100 by 10's, 1 point total				
Scoring				
10 = no impairment	7–9 = ICANS 1	3–6 = ICANS 2	0–2 = ICANS 3	0 = ICANS 4

Shimabukuro-Vornhagen, A. et al., (2021). *Critical Care Management of Chimeric Antigen Receptor Therapy Recipients.* CA Cancer J Clin 2021;0:1–16. doi: 10.3322/caac.21702.

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Targeted Therapies

Immune Modulators
Targeted Biotherapy
Monoclonal Antibody Therapy
Antibody Drug Conjugate (ADC) Therapy

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Targeted Biotherapy
Oral Immunomodulatory and Antiangiogenic Drugs (ImiDs)

Actions:
- Targets neovasculature of tumors to halt growth, prevent tumor invasion and metastasis
- Stimulate T-cells and production of IL-2, IL-10 & IFN-ý
- Inhibits IL-1, IL-6 and modulates IL-12

Examples:
- thalidomide
- lenalidomide
- pomalidomide

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IMiDs
Side Effects

- Birth defects
- Drowsiness/sedation
- **Constipation**
- **Peripheral neuropathy**
- Rash
- Peripheral edema
- Orthostatic hypotension
- Appetite increase and/or weight gain
- Neutropenia and thrombocytopenia
- Tumor lysis syndrome

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Targeted Therapy
Proteosome Inhibitors

- Action: Interacts with myeloma cells in the bone marrow environment and prevents adhesion
  - Inhibits myeloma cells by sending conflicting signals to cell nucleus, thereby, inducing apoptosis
  - Immune modulators
- Common Side Effects – **peripheral neuropathy**, N/V edema, fatigue, fever, thrombocytopenia and neutropenia, TLS, cardiac/pulmonary/hepatic toxicity

bortezimib (Velcade) – constipation/diarrhea, hypotension
carfilzomib (Kyprolis) – renal/pulmonary hypertension
ixazomib (Ninlaro) oral – constipation/diarrhea, neuropathy, thrombocytopenia

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Question

The greatest risk for an infusion reaction exists when administering which of the following agents

A. filgrastim.
B. interleukin.
C. daratumumab.
D. interferon.

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Question

S.A. is receiving trastuzumab and pertuzumab with docetaxel for metastatic breast cancer. The nurse knows S.A. is at risk of

A. elevated liver function tests.
B. cardiotoxicity.
C. hemorrhagic cystitis.
D. palmer-plantar erythrodysesthesia.

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Targeted Therapies
Monoclonal Antibody (mAb) Therapy

- Large proteins cloned from a single cell
- Act on tumor cell surface antigens
- Engineered to recognize specific target antigen associated with a specific cancer
  - Rituximab - targets $CD20^{+}$ (NHL)
  - Daratumumab – targets $CD38^{+}$ (Myeloma)

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mAb Therapy Administration

- Administered as intravenous infusion ***never*** bolus as IVP ⚠
  - Exception subcutaneous
    - Rituximab-hyaluronidase
    - Daratumumab-hyaluronidase-fihj
    - Pertuzumab and trastuzumab-hyaluronidase-zzxf
- High potential for infusion-related reaction due to antigen-antibody reaction
- Sound alike: rituxi**mab**, trastu**zumab**, pertuz**umab**, cetuxi**mab,** daratum**umab**

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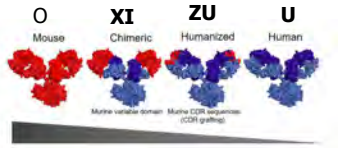
Monoclonal Antibody Nomenclature

- **o** - mouse
- **xi** - cross between mouse & human or chimeric
  - Rituximab – CD20+
- **zu** - humanized
  - Trastuzumab – HER2
- U - fully human
  - Ipilimumab – CTLA-4 receptor



https://www.scielo.br/scielo.php?script=sci_arttext&pid=S1984-82502018000700406

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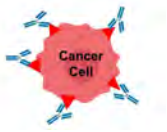
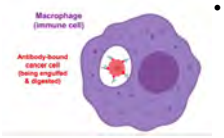
mAb Trigger Immune Action Unconjugated





- No cytotoxic substance attached
- May cause apoptosis or indirectly induce by binding to a cancer cell
- Creates a complex recognizable to immune system resulting in cell death
- **Common side effects: cytokine infusion-related reaction (fever, chills, and/or SOB)**
  - Pre-medicate with antihistamine and acetaminophen
  - Treat reactions with prn medications

http://www.cancer.gov/cancertopics/understandingcancer/targetedtherapies/html

705

Question

Which of the following monoclonal antibodies is classified as a immune checkpoint inhibitors?

A. nivolumab
B. daratumumab
C. ofatumumab
D. trastuzumab

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Unconjugated mAb

- Rituximab
  - Rituximab-abbs (Truxima)
  - Rituximab-pvvr (Ruxience)
  - Rituximab-arrx (Riabni) `
- Eculizumab
- Obinutuzumab
- Avelumab**
  - **anti-PD-1**
- Trastuzumab
  - trastuzumab-dttb (Ontruzant)
  - trastuzumab-anns (Kanjinti)
  - trastuzumab-qyyp Trazimera)
  - trastuzumab-pkrb (Herzuma)
  - trastuzumab-dkst (Ogivri)
  - trastuzumab-strf (Hercessi)
- Margetuximab-cmkb
- Cemiplimab-rwlc**
  - **anti-PD-1**
- Ofatumumab
- Panitumumab
- Pembrolizumab**
  - **anti-PD-1**
- Atezolizumab**
  - **anti-PD-1**
- Necitumumab
- Ramucirumab
- Elotuzumab
- Alemtuzumab

****Checkpoint Inhibitors**

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Unconjugated mAb

- Bevicizumab
  - bevicizumab-awwb (Mvasi)
  - bevacizumab-bvzr (Zirabev)
  - bevacizumab-maly (Almsys)
- Ipilimumab**
  - **CTLA-4 inhibitor**
- Donosumab
- Cetuximab
- Pertuzumab
- Nivolumab
  - **anti-PDL-1**
- Mogamulizumab-kpkc
- Tafasitamab-cxix
- Daratumumab
- Durvalumab**
  - **anti-PDL-1**
- Alemtuzumab
- Olaratumab
- Dinotuximab
- Iontuzumab
- Tremelimumab
- Isatuximab-irfc
- Naxitamab-gqgk
- Zolbetuximab

****Checkpoint Inhibitors**

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Question

S.A. is receiving trastuzumab and pertuzumab therapy for breast cancer. The nurse knows S.A. is at risk for

A. elevated liver function tests.
B. left ventricular ejection fraction reduction.
C. hemorrhagic cystitis.
D. palmer-plantar erythrodysesthesia.

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Question

The nurse is caring for a patient experiencing Grade 2 (moderate) pneumonitis related to treatment with a checkpoint inhibitor. The nurse know the prescriber will order the following

A. corticosteroids and hold checkpoint therapy.
B. follow up office visit and continue checkpoint inhibitor.
C. Discontinue checkpoint inhibitor.
D. Antibiotics and continue checkpoint therapy.

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Immune-related Adverse Effects (irAEs)

System	Adverse Effects	Onset Time Frame (weeks)	Time to Resolution	Management
Lungs	Pneumonitis	10	>20	Less than Grade 1 – proactively assess for symptoms Grade 1 – consider holding therapy and treat symptoms Grade 2 –hold therapy corticosteroids Adjust steroid dose and watch for resolution Grade 3 or 4 – d/c therapy High dose steroids Ifliximab if not responsive to steroids after 1 week
Skin	Rash Vitiligo Pruritis	2-3	6	
GI	Diarrhea colitis	6-7	10	
Liver	Elevated enzymes Elevated bilirubin hepatitis	6-7	14	
Endocrine	Hypophystis (pituitary) Hypothyroidism	After 9	12-14	
Renal	Nephritis Acute kidney injury	14	variable	

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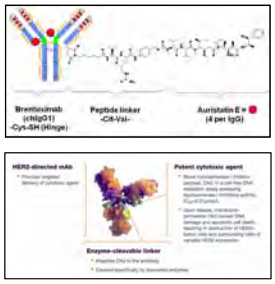
Antibody-drug Conjugate (ADC) Therapy

Bioengineered Agent



Brentuximab vedotin
- Targets CD 20+ cells
- Relapsed/newly diagnosed Hodgkin (AVD plus brentuximab vedotin)
- Relapsed Hodgkin after autologous HSCT

Fam-trastuzumab deruxtecan-nxki
- Targets HER2+ cells
- unresectable metastatic breast cancer after 2 or more HER2 based regimens

Action
1. Antibody attaches to tumor antigen or receptor.
2. Conjugate enters tumor cell.
3. Linker degrades and cytotoxic agent inhibits DNA or microtubules.

https://www.adcreview.com/trastuzumab-deruxtecan-drug-description

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Antibody-drug Conjugate (ADC) Evolution

Bioengineered Agents

- Brentuximab vedotin
  - Non-Hodgkin lymphoma
- Fam-trastuzumab derxtecan-nxki
  - HER2+ unresectable metastatic breast cancer after 2 or more HER2-based regimens
- Ado-trastuzumab emtansine
  - HER-2 positive metastatic breast cancer
- Moxetumomab pasudotox
  - Relapsed/refractory hairy cell leukemia
- Sacituzumab govitecan-hzly
  - Metastatic triple negative breast cancer
- Tisotumab vedotin-tftv
  - Cervical cancer
- Mirvetuximab soravtansine-gynx
  - Folate receptor alpha positive, platinum-resistant epithelial ovarian, fallopian tube, or primary peritoneal cancer
- Ioncastuximab vedotin-tftv
  - R/R Large B cell lymphoma
- Gemtuzumab ozogamicin
  - AML
- Iontuzumab ozogamicin
  - Relapsed/refractory ALL
- Polatuzumab vedotin-piiq
  - Relapsed/refractory NHL (DLBC)
- Belantamab mafodotin-blmf
  - Advanced Myeloma
  - REMS required due to ocular toxicity
- Enfortumab vedotin
  - Advanced urothelial (bladder) cancer

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ADC Adverse Effects

Bioengineered Agents

- Infusion-related reactions
- Peripheral neuropathy
- Neutropenia
- Thrombocytopenia
- Elevated LFTs
- Immunologic rejection and/or reaction
- Product-specific toxicities

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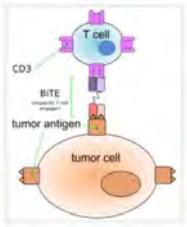
Immunotherapy
Bi-specific T-cell Engagers

Blinatumomab
- CD-19 and CD-3 antigen engager
- Indicated for ALL
  - Relapsed or refractory
  - Minimal residual disease (MRD) after complete remission
- 28-day continuous infusion
  - Do not flush line
    - Aspirate drug from line prior to troubleshooting occlusions or pump alarms
  - Hospitalization required prior to outpatient administration
    - Cycle 1 – 9 days
    - Cycle 2 – 2 days
- Side Effects
  - Cytokine release syndrome (CRS)
    - Pre-medicate with dexamethasone
  - ICANS
  - Infections
  - Elevated liver enzymes
  - Tumor lysis syndrome



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Immunotherapy
Bi-specific T-cell Engagers

Indicated for relapsed or refractory multiple myeloma after 4 lines of therapy:
- Teclistamab-cqyv
  - anti-CD38-directed CD3 T-cell engager
- Talquetamab-tgvs
  - GPRC5D-directed CD3 T-cell engager
- Elranatamab-bcmm
  - BCMA-directed T-cell engager
- Subcutaneous injection using a step-up dose schedule
  - Hospitalization for 24-48 hours after each dose
- REMS program required
- Side Effects
  - CRS
    - Pre-medication required prior to each dose
  - ICANS
  - Infections
  - Elevated liver enzymes
  - Stomatitis, weight loss, and skin toxicity (talquetamab only)

Tecvayli and Talvey Product Information Janssen, 2023; Pfizer, Product Information, 2023

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Targeted Therapies

Small Molecular Therapies

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Question

Which of the following agents is classified as a tyrosine kinase inhibitor?

A. dasatinib
B. sotorasib
C. bevacizumab
D. olaparib

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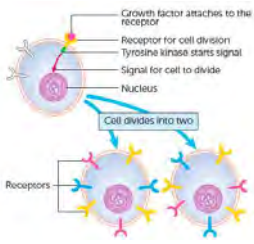
Targeted Therapy
Small Molecular Therapies
-nibs -anibs, -tinibs, -rafenibs, -egibs, -asib, -enib



- Interact with domains of specific intracellular proteins e.g. Inhibition of tyrosine kinase
- Interrupt key intracellular signaling pathways
- Prevent intracellular phosphorylation, ATP production, and cell function or survival

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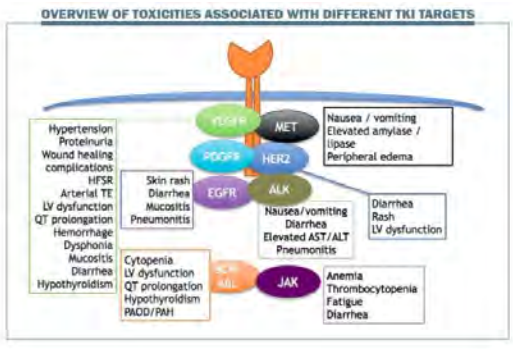

https://cancerworld.net/e-grandround/managing-common-toxicities-with-new-tyrosine-kinase-inhibitors/

720

GENERIC NAME	TARGET	SIDE EFFECTS
Soto**rasib**	KRAS G12C mutation NSCLC	Pneumonitis Cough Hepatotoxicity Diarrhea Pain - musculoskeletal QTc interval prolongation Mg, K, platelet decrease
Olutasi**denib**	IDH1 mutated AML Relapsed/refractory	Differentiation syndrome Diarrhea Hepatoxicity Mucositis Pericardial effusion Acute kidney injury
Futiba**tinib**	FGFR2 gene fusion or other variant Cholangiocarcinoma	Nail toxicity Pain – musculoskeletal PPE syndrome Stomatitis
Capma**tinib**	MET Exon 14 skipping	Pneumonitis Hepatoxicity Pancreatic toxicity
Erlo**tinib**	Metastatic NSCLC EGFR Exon 19 deletion or Exon 21 L858R substation	Pneumonitis GI perforation Hepatotoxicity Stroke

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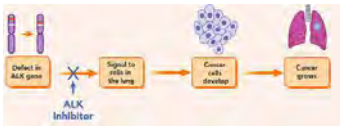
ALK-targeted Kinase Inhibitors
Management

- Early recognition of cardiac toxicity
  - QT interval
- Pulmonary and hepatic toxicity
- Monthly labs
  - electrolyte
  - Blood glucose
- Patient education to avoid
  - OTC medications
  - Grapefruits
  - Seville oranges
  - Vitamins
- Contraception



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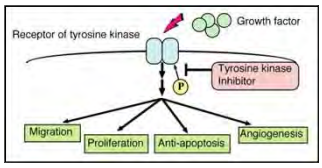
GENERIC NAME	TARGET	SIDE EFFECTS
Crizo**tinib**	ALK+ NSCLC	Prolongation QT interval Pneumonitis Hepatotoxicity N/V/D
Ceri**tinib**	ALK+ metastatic NSCLC	As above
Lorla**tinib**	ALK+ metastatic NSCLC	AV block Peripheral neuropathy and edema Pneumonitis Hypertension hyperglycemia
Pazo**panib**	VGFR, PDGFR, c-Kit Advanced renal cell Soft tissue sarcoma	Hepatotoxicity LVEF dysfunction Hemorrhage GI fistula BMD VTE Hypertension
Cabozan**tinib**	Progressive met medullary thyroid cancer	GI perforations & fistula Hemorrhage VTE/MI Hypertension BMD Hand-foot syndrome

723

Tyrosine Kinase Inhibitors
Management

- Early recognition of cardiac, lung and liver toxicities
  - QT interval
  - Effusions and edema
- Monthly labs
  - CBC
  - Electrolyte
- Patient education to avoid
  - OTC medications
  - Vitamins
- Contraception



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GENERIC NAME	MALIGNANCY	SIDE EFFECTS
Ima**tinib**	Ph+ CML Gastrointestinal stromal tumor (GIST)	NVD Myelosuppression Hepatotoxity Fluid retention & pericardial effusion Peripheral edema **Rash**
Nilo**tinib**	Ph+ CML chronic phase Ph+ CML resistant to imatinib	Prolongation QT interval Electrolyte disturbance Hepatotoxicity - Elevated lipase **Rash** Sudden death
Dasa**tinib**	Ph+ CML Ph+ ALL	Fluid retention Pleural & pericardial effusions Prolongation QT interval Myelosuppression Abdominal pain Hypertension & cardiomyopathy **Rash**
Bosu**tinib**	Ph+ CML resistant or intolerant to other therapies	NVD Myelosuppression Hepatotoxity Fluid retention & pericardial effusion Peripheral edema **Rash**
Asci**minib**	Ph+ CML previously treated with 2 or more TKIs	BMD Pancreatic toxicity Hypertension **Cardiovascular toxicity**
Zanubru**tinib**	Mantle Cell After at least one prior therapy	**Hemorrhage** Cardiac arrhythmia (atrial fib. and atrial flutter) Myelosuppression Rash

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GENERIC NAME	TARGET	SIDE EFFECTS
asci**minib**	ALK-positive NSCLC	Anemia Renal impairment Severe hepatotoxicity
Osimer**tinib**	Exon 19 and 21 EGFR mutation Metastatic NSCLC	Pulmonary Pneumonitis (some fatal) Heart failure Prolongation QT interval Electrolyte imbalance diarrhea Fetal toxicity **Rash**
Ibru**tinib**	BTK Mantle cell lymphoma CLL Small lymphocytic lymphoma Marginal Zone Lymphoma Waldenstrom's Chronic GVHD (after failure of one or more therapies)	NVD Myelosuppression - hemorrhage Hepatotoxity Fluid retention & pericardial effusion Peripheral edema Atrial fibrillation Hypertension Tumor lysis syndrome 2nd malignancy **Rash**
Midasturin	FLT 3+ AML	Febrile device-related infection Mucositis Pneumonitis (some fatal) Prolongation QT interval N/V Headache Cellulitis Febrile neutropenia Fungal infections
Ventoclax*	BCL-2 AML - 75 years and older In combination with low-dose cytarabine CLL	TLS Myelosuppression Diarrhea Upper respiratory tract infection

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GENERIC NAME	TARGET	SIDE EFFECTS
Ponat**inib**	BCR-ABL multi-kinase CML chronic/accelerated/blast phase Resistant/intolerant to other TKIs Ph+ ALL resistant to other TKIs	VTE Hypertension Pancreatitis Heart failure Arrhythmias TLS Impaired wound healing
Ruxoli**tinib**	JAK-1 JAK-2 Intermediate/high-risk Myelofibrosis	Myelosupression Infections
Sor**afenib**	Multi-kinase Advanced RCC Hepatic Cancer	Myelosuppression Increased amylase & lipase Myocardial Infarction Hand-foot syndrome N/V mucositis/Stomatitis Prolongation QT interval Peripheral neuropathy
Gefi**tinib**	NSCLC EGFR Exon 19 deletion or Exon 21 substitution	Interstial lung disease Hepatotoxicity GI perforation Skin reaction
Decomi**tinib**	Metastatic NSCLC Exon 19 deletion or Exon 21 L858R substitution	Interstial lung disease Skin reactions diarrhea

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GENERIC NAME	TARGET	SIDE EFFECTS
Rego**rafenib**	VEGF EGFR Metastatic colorectal cancer treated with other therapies Unresectable GIST after imatinib and sunitinib	Hepatotoxicity Hemorrhage Hand-foot syndrome HTN & MI Impaired wound healing BMD Electrolyte disturbance
Suni**tinib**	Multi-kinase Renal cell cancer GIST PNET	Hypertension Hand-foot syndrome Hypokalemia **Hypothyroidism** ⚠
Axi**tinib**	VGEFR-1 VGEFR-2 VGEFR-3 Advanced renal cell cancer	HTN & VTE GI perforation Elevated LFT GI fistula/perforation
Vande**tanib**	Multi- TKI Advanced medullary thyroid cancer	Prolongation QT interval **Skin reactions** Pneumonitis Heart failure CV Ischemic events HTN N/V/D Abdominal pain & diarrhea

Anti-VEGF/VEGF Receptors - Product Information from Bayer Healthcare Pharma, 2012;Pfizer, 2012; Astrazeneca , 2011

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GENERIC NAME	MALIGNANCY	SIDE EFFECTS
Lapati**nib**	HER-1/EGFR HER-2 Advanced or metastatic HER-2 breast cancer	Diarrhea **Rash** QT interval prolongation LVEF dysfunction
Riboci**clib** In combination with aromatase inhibitor	Advanced or metastatic breast cancer ER positive and HER-2 negative (CDK 4/6 inhibitor)	Neutropenia QT interval prolongation Hepatobiliary toxicity Diarrhea
Alpe**lisib** In combination with fulvestrant	Postmenopausal women and men with HR+, Her2-, PIK3CA-mutated advanced metastatic disease or after progression on or after endocrine therapy	**Severe hypersensitivity** **Severe cutaneous reactions** **Rash** **Hyperglycemia** Pneumonitis Diarrhea Embryo-fetal toxicity
Elacestrant	ESR-1 mutated advanced or metastatic ER positive HER2-negativefollowing at least one line of endocrine therapy	Dyslipidemia Anemia Renal toxicity Hepatic toxicity

M. Olsen, et al., 2023; Stemline Therapeutics, 2023.

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Poly (ADP-ribose) Polymerase (PARP) Inhibitor

GENERIC NAME	TARGET MALIGNANCY	SIDE EFFECTS
Olapa**rib**	Ovarian or primary peritoneal cancer • Maintenance therapy • Germline BRCA-mutated advanced ovarian cancer <u>Breast Cancer</u> BRCA –mutated and HER2 negative metastatic breast cancer	MDS/AML Pneumonitis BMD Arthralgia Myalgia stomatitis Embryo-fetal toxicity

M. Olsen, et al., 2023

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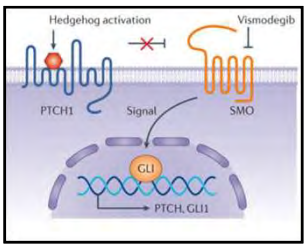
Hedgehog Pathway Inhibitor Management

- Monitor for muscle spasms, myalgia, and arthralgia
- Patient education to avoid
  - OTC medications
  - Grapefruits
  - Seville oranges
  - Vitamins



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Hedgehog Pathway Inhibitors

GENERIC NAME	TARGET MALIGNANCY	SIDE EFFECTS
Vismod**egib**	Metastatic basal cell (advanced or recurrent unresectable/not RT candidate)	N/V/D Anorexia Weight loss Muscle spasms Arthralgias Dysguesia (taste distortion)
Sonid**egib**	Metastatic basal cell recurring after surgery	As above
Glasd**egib**	Newly diagnosed AML in combination with low-dose cytarabine ≥age 75 with comorbidities	QTc prolongation

Olsen, M. et al., 2023

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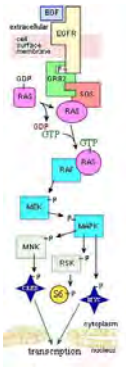
RAS/RAF/MEK/MAPK Inhibitors
Management

- Early recognition for diarrhea, lung and liver toxicities
- Monitor labs
  - LFTs
  - Electrolytes
- Patient education to avoid
  - OTC medications
  - Grapefruit
  - Seville oranges
  - Herbal supplements
- Contraception



By Fred the OysterThe source code of this SVG is valid.This vector image was created with Adobe Illustrator., CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=36247188

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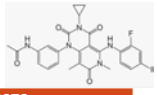
RAS/RAF/MEK/MAPK Inhibitors



GENERIC NAME	TARGET MALIGNANCY	SIDE EFFECTS
Binime**tinib**	Unresectable metastatic melanoma	Cardiomyopathy VTE Retinopathy Interstitial lung disease Hemorrhage
Trame**tinib** Dabran**fenib**	Metastatic melanoma	**Rash** Hemorrhage DVT Cardiomyopathy Fever
Vemura**fenib**	Metastatic melanoma	As above
Encora**fenib**	Metastatic melanoma Metastatic colon	As above Uveitis QT prolongation

Olsen, M. et al., 2023; Pfizer, 2021

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IDH-1 Inhibitor

GENERIC NAME	TARGET MALIGNANCY	SIDE EFFECTS
Ivosid**enib**	AML Cholangiocarcinoma	Differentiation syndrome Pericardial effusion Hypotension Multi-organ failure
Enasid**enib**	Relapsed or refractory AML with IDH2 alteration	

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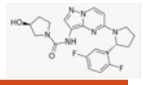
TRK and ROS1 Inhibitors



GENERIC NAME	TARGET MALIGNANCY	SIDE EFFECTS
Larotrec**tinib**	Solid Tumor with NTRK gene fusion with no alternative therapy or with disease progression	Delirium Dizziness Tremors Hepatotoxcity Embryo-fetal toxicity
Entrec**tinib**	Metastatic ROS-1 positive NSCLC Solid Tumor with NTRK gene fusion who are unresectable or with disease progression	CHF Cognitive impairment Visual disturbance Hepatotoxicity QTc prolongation Paresthesia Hyperuricemia Embryo-fetal toxicity

Olsen, M. et al., 2023

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mTor Kinase Inhibitors

GENERIC NAME	TARGET MALIGNANCY	SIDE EFFECTS
Everolimus	Advanced renal cell Advanced breast cancer HER2+ Advanced pancreatic carcinoid tumors	**Stomatitis (dose-limiting & most frequent toxicity)** Non-infectious pneumonitis Hyperglycemia Hyperlipemia Renal failure
Temsirolimus	Advanced renal cell	Hepatic toxicity Infection Hyperlipemia Hyperglycemia Wound impairment

Olsen, M. et al., 2023

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GENERIC NAME	TARGET MALIGNANCY	SIDE EFFECTS
belzutifan	RCC pancreatic neuroendocrine tumors (pNET)	Anemia Hypoxia Hyperglycemia Renal impairment Hormonal contraception ineffective
belumosudil	Chronic GVHD after 2 systemic therapies	Infection Hypertension Fatigue (asthenia) Nausea
Infigra**tinib** pemiga**tinib**	Unresectable cholangiocarcinoma with FGFR2 fusion	Nail toxicity Stomatitis Hand foot syndrome (PPE) Elevated LFT
tivoza**nib**	Relapsed/refractory RCC	Hypertensive crisis Cardiac failure VTE Proteinuria

M. Olsen et al., 2023

738

GENERIC NAME	MALIGNANCY	SIDE EFFECTS
Tepo**tinib**	METex14+ mNSCLC	Interstitial pneumonitis Hepatotoxicity Lymphopenia Hepatotoxicity
Pralse**tinib**	RET+ mNSCLC Advanced Thyroid cancer	Pneumonitis Hypertension Hepatotoxicity Tumor lysis syndrome Hemorrhage
Lurbinectedin	mSCLC Progression after platinum agent	Myelosuppression Hepatotoxicity
Selperca**tinib**	RET+ mNSCLC RET+ Advanced met Thyroid cancer	Pneumonitis Hypertension Hepatotoxicity QTc prolongation Tumor lysis syndrome Hemorrhage

M. Olsen, et al., 2023

739

GENERIC NAME	MALIGNANCY	SIDE EFFECTS
Capma**tinib**	mNSCLC Tumor mutation skipping leading MET Exon14+	Interstitial pneumonitis ⚠ Hepatotoxicity Photosensitivity Acute kidney injury
Ripre**tinib**	Advanced GIST after 3 or more TKIs including imatinib	PPE Hypertension Cardiac dysfunction ⚠ Impaired wound healing
Avapri**tinib**	Exon mutation 18 PDGF mGIST Mast cell leukemia	Intracranial hemorrhage ⚠ Cognitive toxicity
Belinostat	Relapsed refractory T-cell peripheral lymphoma	Pneumonitis Hepatotoxicity Myelosuppression TLS
Duvelisib	CLL Follicular lymphoma	Infection Pneumonitis Skin reaction hepatotoxicity

M. Olsen, et al., 2023

740

FDA-Approved in 2024-2025

lazer**tinib**	ensar**tinib**	tovora**fenib**	vorasi**denib**	inavo**lisib**	revume**nib**
mirdame**tinib**	vimsel**tinib**	repotrec**tinib**			
lifi**leucel**	afamitresgene autol**eucel**	obecabtagene utol**eucel**	remes**temcel**-L-rknd (pediatric)		
zolbetu**ximab**-clzb	tisleli**zumab**-jsgr	cosibeli**mab**-ipdl	datopota**mab** deruxtecan-dlnk	zanidata**mab**-hrii	
nogapendekin alfa inbakicept-pmln	zenocutu**zumab**-zbco	tarlata**mab**-dlle	trastu**zumab**-strf		
imetelstat	treosulfan	axatili**mab**-csfr			

742

How to Keep Up?

- http://www.cancer.gov/dictionary
- http://www.fda.gov/Drugs/InformationOnDrugs/ApprovedDrugs/ucm279174.htm
  - ✓ sign up for alerts
- https://www.ons.org/learning-libraries/drug-development

743

FDA-approved New Drugs in 2024-25

- **27 new agents** (1/1/2024 to 2/19/2025)
  - 20 solid tumor agents
  - 6 hematologic agents
  - 21 Molecularly Targeted/Immunotherapy
  - IL-15 Agonist Immunotherapy
  - 3 Cellular Therapies
  - Mesenchymal Stem Cell Therapy
  - Oligonucleotide Telomerase Inhibitor
  - Alkylating Agent
- Plus 32 drugs with 41 additional disease indications

741

Oral Oncolytics
Strategies for Best Practice

ONS ORAL ANTICANCER MEDICATION TOOLKIT

- Schedule 2 educational appointments prior to prescribing agent
- Maintain weekly call log of every patient
  - Develop standardized documentation of telephone calls
    - Administration instructions
    - Precautions
    - ⚠ **Monitor for drug-drug and drug-food interactions**
- Follow-up call 48 hr after starting oral oncolytic or clinic visit within one week
- Dedicate team of nurses, pharmacists, or APRNs for oral oncolytics therapy
- Develop workflows
- Initial education and annual competency for nurses
- Assign coordinator to help patients obtain and pay for oral therapy

ONS Oral Anticancer Medication Toolkit
https://www.ons.org/sites/default/files/2023-05/23%20OAM%20toolkit.pdf

M. Olsen, et al., 2023

744

Risk Reduction - Treatment Plan
ASCO/ONS Antineoplastic Safety Standards 2024

- Use preprinted or electronic orders
  - **Ordersets/protocols for CRS/ICANS**, extravasation, and irReactions
  - Avoid abbreviations
- **Avoid verbal/telephone orders**
- **Assess orders for completeness (compare orders to formal drug protocol or reference)**
- **Dual verify actual height and weight, at least one licensed clinician**
- **Dual verification of dose and regimen**
- Determine vesicant or irritant potential
- Ensure informed consent
- **Pregnancy avoidance, testing, and contraception counseling**
- **Assess for social determinants of health** and prior experience with therapy

M. Olsen, et al., 2023; Siegel, R. D. et al., 2024. Antineoplastic Therapy Administration Safety Standards for Adult and Pediatric Oncology: ASCO-ONS Standards.

745

Four Dual Verifications* Prior to Drug Administration
ASCO/ONS Antineoplastic Safety Standards 2024

- **2 trained providers verify ***
  - Orders and agents
  - Drug name and dose
  - Appearance of drugs
  - Expiration date or Beyond Use Date (BUD) and time
  - Drug sequence, if applicable
  - Premedications given, if applicable
- **Use at least 2 different unique* patient identifiers at bedside**
- Dual MAR signatures
- **Infusion pump verification***
  - Infusion pump program
  - "Smart Pump" device EMR integration, if available
- **"Trace the line" and IV clamps open***
- Signs and symptoms to report

M. Olsen, et al., 2023; Siegel, R. D. et al., 2024. Antineoplastic Therapy Administration Safety Standards for Adult and Pediatric Oncology: ASCO-ONS Standards.

746

Hazardous Drugs
Definition

Drugs that exhibit one or more of the following characteristics:

- Carcinogenicity
- Teratogenicity or developmental toxicity
- Reproductive toxicity
- Organ toxicity at low doses
- Genotoxicity
- Drug similar in structure or toxicity

Olsen, M. et al., 2023

747

Potential Routes of Exposure

- Absorption
- Injection
- Inhalation
- Ingestion

Olsen, M. et al., 2023

748

Question

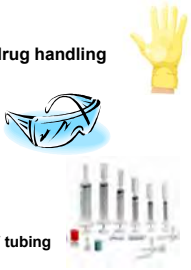
Safety-related interventions when administering chemotherapy agents include

A. creating positive pressure within the vial.
B. use of a closed system transfer device.
C. carefully removing the uncontaminated gown so that it may be used later.
D. priming intravenous tubing with chemotherapy.

749

Safe Handling Considerations

- **Always wear PPE approved for hazardous drug handling**
  - double glove (except oral), gown, goggles
- Work below eye level
- Spill kit and hazardous waste container
- Engineering controls
  - Class II or III safety cabinet (Pharmacy only)
  - **Closed-system device (CSTD) syringes and IV tubing**
- Use disposable, absorbent, and plastic-backed pads in work areas
- Place absorbent gauze pad under syringe at injection ports



M. Olson, et al., 2024

750

Question

According to NIOSH, respiratory protection to manage a large hazardous spill requires a

A. isolation mask.
B. surgical N-95 mask.
C. full face chemical respirator.
D. face shield with isolation mask.

751

Respiratory Protection

- Small spills require surgical N-95 mask
- Large spills and agents that vaporize at room temperature require full face chemical canister-type respirator or powered air purifying respirator (PAPR)
- Agents that vaporize at room temperature
  - Carmustine
  - Cisplatin
  - Cyclophosphamide
  - Etoposide
  - 5-fluorouracil
  - Ifosfamide
  - Nitrogen mustard
  - Thiotepa

M. Olsen, et al., 2023

752

Question

Gloves worn during hazardous drug handling must be changed every

A. 60 minutes.
B. 2 hours.
C. 4 hours.
D. 30 minutes.

753

Handling of Bodily Fluids

Chemotherapy Precautions

- 48 hours post-chemotherapy
  - many ORAL AGENTS – 7 Days
- PPE - double glove, gown & face shield
- Apply protective barrier ointment for incontinent patient
- flush toilet with lid down or cover with disposable chux

M. Olsen, et al., 2023

754

Handling of Bodily Fluids

Agents Requiring PPE Greater than 48 Hours

Chemotherapy	Presence in Urine	Presence in Stool or Bile
Carmustine	4+ days	
Cisplatin	5+ days	
Docetaxel	6% excretion	Up to 1 week
Doxorubicin	Up to 5 days	Up to 1 week
Etoposide	5+ days	
Gemcitabine	7 days	
Mitoxantrone	Up to 5 days	Up to 5 days
Teniposide	Up to 5 days	
Vincristine	minimal	Up to 3 days
Vinorelbine	minimal	3+ days

M. Olsen, et al., 2023

755

Question

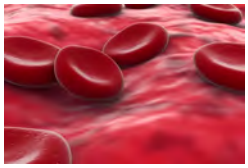
If information regarding excretion time of a hazardous drug is unknown, handling precautions require use of personal protective equipment for a duration of

A. 24 hours.
B. 96 hours.
C. 48 hours.
D. 72 hours.

756

Hematopoietic Stem Cell Transplantation (HSCT)

Use of hematopoietic progenitor cells, bone marrow or umbilical cord blood from a donor to a recipient



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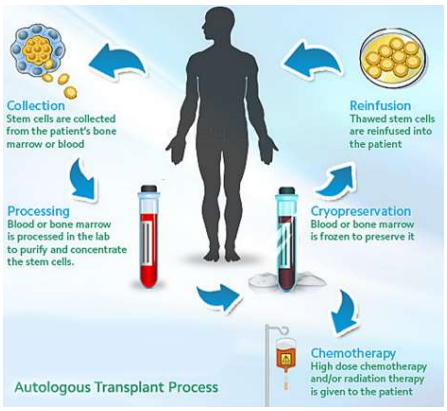
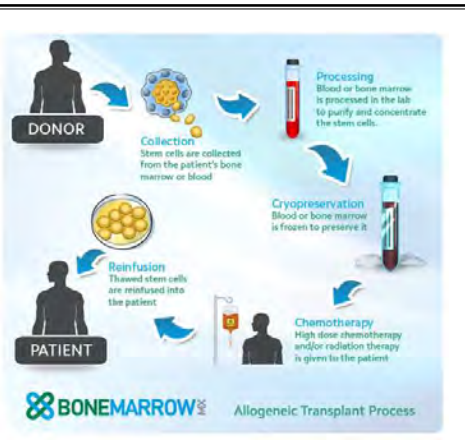


758

TYPE	Subtype	Cell Source	Advantages	Disadvantages
Autologous Myeloma Lymphoma (relapsed) Solid tumors Sarcoma Testicular CNS Autoimmune disorders Lupus	**Myeloablative**	Patient's own cells following remission	No graft failure or (GVHD) Immune system recovers within 1 year	Possible residual cancer cells No graft vs tumor effect (GVT)
Allogeneic Leukemias MDS Aplastic Anemia Sickle Cell Disease Severe Immunodeficiency Syndrome	**Myeloablative** (Profound myelosuppression)	Matched related donor/ haploidentical e.g. sibling, parent or Matched unrelated donor (MUD) Mismatched unrelated donor (MMUD)	Graft vs. tumor effect (GvT)	GVHD Graft failure Relapse
	Reduced-Intensity Shorter period of myelosuppression (30% dose reduction)		Less toxicity (Lower doses chemo or RT) Older age recipients with stable / co-morbidities GvT effect	
	Non-myeloablative No neutropenia			
		Umbilical cord HPC related or unrelated donor	GvT effect Less GVHD	Prolonged time for engraftment GVHD
Syngeneic (Twin)		Identical twin	No GVHD	No GvT effect Relapse

760



759

Recipient
Pre-Transplant Evaluations

- Financial screening
- Disease status
  - minimal to no residual disease
- Vital organ testing
- Dental evaluation
- Psychosocial evaluation
- Nutritional evaluation and education
- Caregiver evaluation
- HLA-typing (protein marker on cells of body)
  - allogeneic transplants only

- Donor search & workup (confidential if unrelated donor)

Preparation → Conditioning → Cell Infusion → Engraftment

761

Cell Collection

- Mobilization peripheral HPC or Bone Marrow Collection
  - Autologous – donor is recipient
  - Allogeneic – donor is related or unrelated
    - Human leukocyte antigen (HLA) system 10/10 allele match ideal or 8/10 acceptable
    - Haploidentical 5/10 match, if no matched unrelated donor is found

- **Minimum cell collection**
- Autologous - 2.5 x 10^6 /kg recipient's body weight $CD34^+$ cells
- Allogeneic - Minimum 5.0 x 10^6/kg CD34+ cells
- Bone marrow harvest – 10 mL/kg TNC recipient's body weight
- Umbilical cord – 2 cords needed for adults

Schmit-Pokorny, K. & S. Eisenberg, 2020

762

Conditioning Therapy

- Recipient begins conditioning chemotherapy regimen (myeloablative, reduced-intensity (RIC) or non-myeloablative)
  - Empties marrow to make space for donor cells and treat residual disease
- May include total body irradiation (mainly allogeneic transplant recipient)
  - Destroys residual malignant cells and immunosuppresses recipient
- Allogeneic recipients require immunosuppression

Preparation → Conditioning → Cell Infusion → Engraftment

Schmit-Pokorny, K. & S. Eisenberg, 2020

763

Day 0
Infusion Side Effects

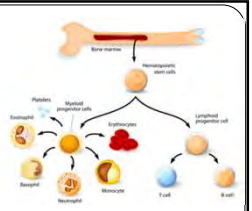



- Cryopreserved stem cells
  - Citrate toxicity
  - DMSO – "garlic" or "cream corn" odor
- Nausea, vomiting & diarrhea
- Fever & chills
- Pulmonary complications
- Thrombocytopenia
- Macroscopic hematuria
  - Hemolysis of lysed RBC

Preparation → Conditioning → Cell Infusion → Engraftment

764

Engraftment Definition



- Recipient's body accepts donor cells and begins to produce neutrophils and platelets
- Time from Day 0 to donor cell engraftment
  - ANC >500 for 3 consecutive days
    - Usually occurs Day +15 to Day +20
  - Platelet count > 20,000 for 3 consecutive days without transfusion for 7 days
    - Usually occurs Day +21 to Day +28

Preparation → Conditioning → Cell Infusion → Engraftment

Schmit-Pokorny, K. & S. Eisenberg, 2020

765

Infection Prevention
Antimicrobial Agents

Antifungals
- fluconazole (Diflucan)
- voriconazole (Vfend)
- posaconazole (Noxafil)

Antiviral
- Acyclovir
- valcyclovir (Valcyte)
- Letermovir (Prevymi)
- (CMV^+ allogeneic transplant only)

Pneumocystis Jerovici (Carinii) Pneumonia
- trimethoprim-sulfamethoxazole (bactrim)
- pentamidine
- dapsome
- atovaquone (Mepron)

Antibiotic (while neutropenic)
- Ciprofloxacin
- Levofloxacin

Schmit-Pokorny, K. & S. Eisenberg, 2020

766

Hepatic Sinusoidal Obstructive Syndrome
HSOS

- Toxic liver injury due to endothelial injury to liver
- Cytokine and tumor necrosis factor activation stimulates coagulation and thrombosis within liver sinusoids
- Associated with high-dose chemotherapy (cyclophosphamide and busulfan) and TBI
- Less common in non-myeloablative HSCT
- 30% incidence and 70% mortality
- **Signs and symptom triad prior to Day $^+20$**
  - Hyperbilirubinemia
  - Painful hepatomegaly
  - Sudden weight gain due to fluid retention

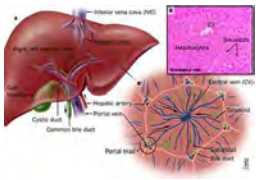
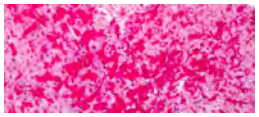
Schmit-Pokorny, K. & S. Eisenberg, 2020

767

Hepatic Sinusoidal Obstructive Syndrome

Medications
- Ursodiol
- Diuretics
- Renal dopamine
- Defibrotide

Monitor
- LFTs
- Weight
- Abdominal pain
- Renal function

Schmit-Pokorny, K. & S. Eisenberg, 2020

768

GVHD

Acute

- Activated donor T-cells attack host tissues

– skin, liver, GI

Chronic

- B-cells attack host

- involves any organ – oral, skin, eyes, GI, pulmonary etc.

769

Post-Transplant Care

- Manage acute toxicities
- Infection prophylaxis and treatment
- Special blood product support to prevent transfusion-associated GVHD and infection
  - **Leukoreduced and irradiated**
  - **Pathogen-reduced platelets (Intercept®)**
  - **Single donor platelets to reduce alloimmunization**
- Electrolyte replacement
- Nutritional support
- GVHD prophylaxis (tacrolimus, sirolimus, cyclosporine or mycophenolate mofetil, cyclophosphamide and anti-thymocyte globulin)
- GVHD management
  - **Steroid therapy is primary treatment**
- Transition to outpatient
- Long-term follow-up
  - Infection prevention and management
  - Disease relapse
  - Subsequent malignancy
  - Hormonal deficiency
- Survivorship – Quality of Life

Schmit-Pokorny, K. & S. Eisenberg, 2020

770

Question

Alice requires a stem cell transplant for leukemia. Alice has no living siblings. This type of transplant is

A. autologous.
B. allogeneic.
C. syngeneic.
D. single umbilical cord.

771

Question

Acute graft-versus-host disease is a result of the recipient's tissues being attacked by

A. Recipient T-cells.
B. Donor B-cells.
C. Recipient B-cells.
D. Donor T-cells.

772

Question

The purpose of total-body irradiation (TBI) prior to allogeneic transplant is to

A. destroy bacteria in the recipient.
B. deplete T-cells in preparation for donor cells.
C. mobilize stem cells.
D. destroy residual malignant cells and immunosuppress the recipient.

773

Question

S.L. is seven days post-allogeneic transplant. A complete blood count reveals an absolute neutrophil count of 100/mm^3, hemoglobin 7.5g/dL, and platelet of 7,000/dL. He is in stable condition. The nurse can anticipate orders for

A. red blood cells and pooled platelets.
B. leukoreduced and irradiated packed red blood cells.
C. pathogen-reduced single donor platelets.
D. leukoreduced and irradiated packed red blood cells and pathogen-reduced single donor platelets.

774

Question

The primary role of the nurse in blood and marrow transplantation during pre-engraftment is to

A. reduce the risk of injury due to infection and bleeding through patient education.
B. encourage patients to manage anxiety due to protective isolation.
C. reduce risk of infection by administering vaccines.
D. co-administer mesna and high dose cyclophosphamide.

775

Symptom Management & Palliative Care

21% Test Content = 30 Questions

776

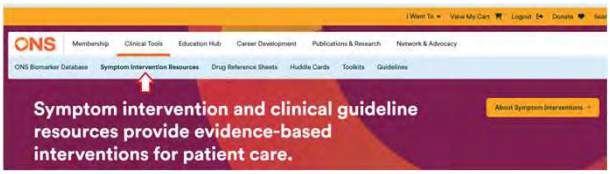
IV. Symptom Management and Palliative Care - 21%

A. Etiology and patterns of symptoms (acute, chronic, late)
B. Anatomical and surgical alterations (e.g., lymphedema, ostomy, site-specific radiation)
C. Pharmacologic interventions
D. Complementary and integrative modalities (e.g., massage, acupuncture, herbal supplements)
E. Palliative care considerations
F. Alterations in functioning
   1. Hematologic
   2. Immune system
   3. Gastrointestinal
   4. Genitourinary
   5. Integumentary
   6. Respiratory
   7. Cardiovascular
   8. Neurological
   9. Musculoskeletal
   10. Nutrition
   11. Cognition
   12. Energy level (i.e., fatigue)
G. Pain Management

OCN Test Content Outline, 2024

777

ONS Clinical Tools
Symptom Management Resources



https://www.ons.org/clinical-tools/pep

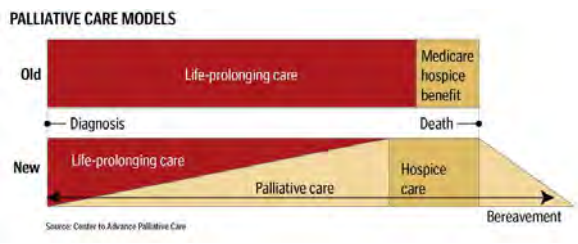
778

SYMPTOM MANAGEMENT PATTERN

- Acute – occurs immediately after treatment begins
  - GI toxicity (N&V, diarrhea), BMD, pain, fatigue, and sleep disturbance
- Chronic – persistent symptoms after treatment ends
  - As per acute
- Late – occur months to years after treatment ends
  - Fatigue, insomnia, cognitive impairment, pain, pulmonary fibrosis, cardiomyopathy, malabsorption syndrome and dyspnea

779

CURRENT VS. RECOMMENDED PRACTICE



A continuum of care that includes hospice care & bereavement counseling

Spugnardi, J Health Progress, 2011, 48.

780

PALLIATIVE CARE DEFINITIONS

- Care for patients with advanced cancer
  - "Care throughout the continuum of illness involves addressing physical, intellectual, emotional, social, and spiritual needs and to facilitate patient autonomy, access to information, and choice." **(Electronic Code of Federal Regulations. CMS: Hospice, 2019)**
- **"Patient and family-centered care designed to optimize anticipate, prevent, and mange physical, psychological, social and spiritual suffering to optimize quality of life for patients, their families and caregivers." (NCP, 2018, p. ii)**
  - National Consensus Project, 2018

https://www.nationalcoalitionhpc.org/wp-content/uploads/2018/10/NCHPC-NCPGuidelines_4thED_web_FINAL.pdf

781

PALLIATIVE CARE

- **Begins at time of diagnosis and includes hospice care and bereavement counseling**
  - Prognosis less than 1 year
- Significant symptom burden from disease or treatment
- Significant social or psychosocial distress
- Performance status ≥ 3
  - Limited self-care: confined to bed or chair >50% of waking hours
- May be initiated by primary oncology team and augmented by palliative care experts based on patient & family needs

ONS Position Statement *Palliative Care for People with Cancer, May 2022.*
https://www.ons.org/network-advocacy/position-statements/palliative-care-people-cancer

782

QUESTION

When patients with multiple symptoms are admitted to palliative care, the first nursing action is

A. assessing how the family is coping.
B. talking with the family about hospice plans.
C. developing a therapeutic relationship.
D. assessing the patient's symptom burden.

783

QUESTION

Palliative care is becoming more widely accepted as evidenced by

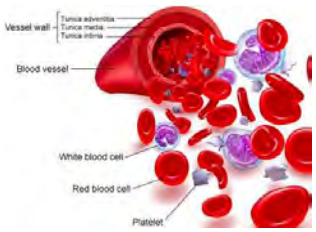
A. its availability in multiple facilities and home care.
B. certification programs for nurses and physicians.
C. family members' demand for palliative care programs.
D. healthcare providers developing skill sets to manage symptoms.

784

MYELOSUPPRESSION

Reduced production of RBCs, WBCs & Platelets resulting in mild, moderate, severe or life-threatening

- Neutropenia
- Anemia
- Thrombocytopenia



785

QUESTION

How is an absolute neutrophil count calculated?

A. % neutrophils + % bands divided by WBC
B. Total WBC divided by % neutrophils + bands
C. % neutrophils + % bands multiplied by total WBC
D. Number of neutrophils + bands x total WBC

786

TOXICITY & GRADING SCALES

- Common Terminology Criteria for Adverse Events (CTCAE) developed by US National Cancer Institute
- **Tool used to assess & document individual toxicities or signs and symptoms**
  - Rate severity using standardized scale
    - Grade 1 – mild
    - Grade 2 – moderate
    - Grade 3 – severe
    - Grade 4 – life-threatening
- Used for scientific reporting of clinical trials data
  - Identify trends in study population

CTCAE, v5.0, 2017

787

QUESTION

The oncology nurse knows the patient's risk of infection increases when which of the following is true?

A. Absolute neutrophil count of 2500/mm^3
B. White count less than 4.2 x 1000/µL
C. Absolute lymphocyte count less than 1500/mm^3
D. Absolute neutrophil less than 1500/mm^3

788

NEUTROPENIA GRADING & SEVERITY

Normal WBC: 4.5–13 x 1000/µL
Neutrophils comprise 44% - 76% of total WBC
1st line of defense against infection

GRADE	SEVERITY	ANC	Risk for Infection
1	Mild	<LLN - 1500	None
2	Moderate	<1500 - 1000	Slight
3	Severe	<1000 - 500	Moderate
4	Life-threatening	<500 <100	High Risk Profound

CTCAE v5.0, 2017

789

RISK FACTORS TREATMENT-RELATED

- Chemotherapy
  - Prior & current
  - Type of agents, dose, dose density & treatment duration
  - Concurrent agents or modalities
- Hematologic vs. solid tumor malignancy
  - Bone marrow involvement
- Elevated lactate dehydrogenase (LDH)
- Hypoalbuminemia
- Pre-existing cytopenias
- Biotherapy & steroids
- Hospitalization
- Radiation therapy to marrow-producing areas
  - Pelvis, ribs, sternum, skull or metaphyses of long bones

Olsen et al., 2023

790

RISK FACTORS PATIENT-RELATED FACTORS

- Age> 65
- Female
- BSA >$2m^2$
- Poor performance status (ECOG PS>2)
- Malnutrition - albumin ≤3.5 g/dL
- Immunosuppression
- Co-morbidities
  e.g. COPD, diabetes, cardiac/renal or liver disease
- Open wounds or recent surgery
- High tumor burden or tumor involving bone marrow
- Active infection or pre-existing fungal infections
- Mucositis, colitis or typhlitis
- ICU admission
- DIC
- Arrhythmia or ECG changes
- Transfusion dependent

791

QUESTION

When caring for a neutropenic inpatient, the nurse should

A. remove water pitchers from the room.
B. follow infection precautions.
C. prohibit fresh fruits and vegetables.
D. use clean technique when providing central line care.

792

Neutropenic Precautions

- **EBP - Strict hand hygiene with soap and water or alcohol-based hand rubs**
- Teach oral and body hygiene
- G-CSF, if indicated (febrile neutropenia risk)
- Preventive antimicrobials
  - hematologic malignancies or patient at high-risk for febrile neutropenia
- Avoid invasive procedures/devices
- Central line care bundle
- CDC safe food handling guidelines
  - US Dept. of Health
- Monitor vital signs q4h monitor fever/chills
- Environmental intervention
- Patient education
  - **Who to call and when**
- Vaccination
  - Influenza
  - Pneumococcal and meningococcal
- Vaccinate caregivers
- Avoid visitors with active infection or recently vaccinated

Olsen et al., 2023; ONS Prevention of Infection: General Clinical Interventions, 2019

793

CSF	AGENT	DOSE	SIDE EFFECTS
G-CSF	filgrastim filgrastim-sndz filgrastim-ayow TBO-filgrastrim	5 µ/kg daily 300 mcg or 480 mcg Start 24 hr after last chemotherapy	Bone pain Myalgia Arthralgia Fever
Pegylated G-CSF	pegfilgrastim pegfilgrastim-jmdb pegfilgrastim-cbqv pegfilgrastim-apgf pegfilgrastim-pbbk Pegfilgrastim-bmez	6 mg per cycle Start 24 hr after last chemotherapy	For bone pain use - naproxen 225 mg or loratadine 10 mg q12h for symptom control
GM-CSF Multi-lineage	Sargomastin	250 µ/m2/day Start 24 hr after last chemotherapy	

794

QUESTION

A patient calls the cancer center to report a temperature of 39C (102.2F). She received chemotherapy regimen ten days ago. What is the nurse's best response?

A. Follow infection precautions.
B. Take acetaminophen 650 mg. and check oral temperature in four hours.
C. Immediately arrange travel to the cancer center.
D. Arrange for an office visit tomorrow.

795

MEDICAL EMERGENCY FEBRILE NEUTROPENIA

- Medical emergency
- Rapid assessment for clinical deterioration
  - Temperature >38C for >1 hour or 38.3C onetime
  - Hypotension – BP <90 mm Hg
  - Tachypnea – RR >24/min
  - Tachycardia – HR >90/min
- Rigors/Chills

Note: severe neutropenic patients may not mount fever

796

FEBRILE NEUTROPENIA MANAGEMENT

- Blood cultures
  - Monitor report and adjust antibiotic therapy
- CBC with differential
- BMP
- Lactate level
- CXR
- Other cultures prn (urine/stool/respiratory viral panel)
- Broad Spectrum antibiotics within 1 hour (cefepime most common first-line)
- Crystalloid infusion for hypotension (NS or RL)
- Growth factor support prn
- Rapid Response Team and transfer to ICU, if unstable
- Respiratory support

797

QUESTION

The normal lifespan of red blood cells is

A. 1 to 3 days.
B. 4 to 6 days.
C. 90-120 days.
D. 10 to 12 days.

798

ANEMIA

Normal Values
- Females 11.5 – 15.5 g/dL
- Males 13.5 – 17.5 g/dL

GRADE	SEVERITY	Hgb (g/dl)
1	Mild	<LLN - 10
2	Moderate	<10 - 8
3	Severe	<8 – 6.5
4	Life-threatening	<6.5

CTCAE v5.0, 2017

799

QUESTION

L.A. received four cycles of chemotherapy and is experiencing anemia. The oncology nurse knows to assess L.A. for signs and symptoms of

A. bradycardia and hypotension.
B. bleeding and petechiae.
C. peripheral edema.
D. fatigue and headache.

800

ANEMIA SIGNS & SYMPTOMS

- Related to reduced oxygen to tissues and organs
  - Fatigue
  - Dyspnea
  - Syncope
  - Chest pain
  - Tachycardia and palpitations
  - Poor concentration
  - Cold intolerance
  - Headache
  - Pallor

801

RISK FACTORS DISEASE-RELATED

- Autoimmune hemolytic anemia
- Chronic GI bleeds
- Malnutrition with folic acid or iron deficiency
- Cardiopulmonary disease
- Chronic renal insufficiency
- Erythroid leukemia
- Invasion of bone marrow by tumor cells
  - Multiple myeloma
  - Lymphoma
  - Leukemia
  - Myelodysplastic syndrome

802

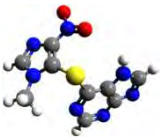
RISK FACTORS PATIENT-RELATED

- Age >65
- Co-morbidities
  - Renal
  - Hepatic
  - Cardiac
- Alcohol abuse
- Malnutrition with folic acid or iron deficiencies
- Female

803

RISK FACTORS TREATMENT-RELATED

- Chemotherapy
  - Platinum agents
    - Cisplatin (binds to RBCs)
  - High-dose therapy for HSCT
  - Immunotherapies
  - Number of doses
  - Dose intensity
  - Drug-induced RBC aplasia
- Radiation therapy



804

QUESTION

A contraindication to erythropoietin therapy is

A. renal insufficiency.
B. neutropenia.
C. hyperbilirubinemia.
D. uncontrolled hypertension.

805

ANEMIA MANAGEMENT

- RBC transfusions
  - Transfuse if hemoglobin<7.0 g/dL
    - exception: symptomatic or acute coronary syndromes with anemia
- Blood conservation
- **ESA therapy if hgb <10 g/dL** ⚠
  - restricted to patients with incurable nonmyeloid malignancies
    - increases risk of VTE and mortality
    - Increases cost of care
  - **Contraindicated in patients with uncontrolled hypertension**
- Iron and vitamin supplementation prn
- Energy conservation
  - Balance with exercise
- Symptom journal
- Oxygen prn
- Nutrition support

806

THROMBOCYTOPENIA

Normal platelet count 150,000 – 400,000/ mm³
Lifespan is 7-8 days

GRADE	SEVERITY	PLATELET COUNT /mm³
1	Mild	<LLN – 75,000
2	Moderate	75,000 – 50,000
3	Severe	50,000 – 25,000
4	Life-threatening	<25,000

CTCAE v5.0, 2017

807

RISK FACTORS TREATMENT-RELATED

- Chemotherapy
- Pelvic RT
- Biotherapy
- Endotoxins from bacteria
  - Fever
- Drug interactions
  - Aspirin
  - Clopidogrel
  - Digoxin
  - Furosemide
  - Heparin
  - Phenytoin
  - Quinidine
  - Sulfonamides
  - Tetracycline
  - NSAIDS ⚠

808

RISK FACTORS DISEASE-RELATED

- Risk factors for neutropenia or myelosuppression
- Underlying platelet disorder
  - Idiopathic thrombocytopenia pupura [ITP]
  - Thrombotic thrombocytopenia pupura [TTP]
- Coagulation abnormality
- Splenomegaly
- Invasion of bone marrow by tumor cells
  - Leukemia – Lymphoma – Multiple Myeloma
  - Myelodysplastic syndrome
  - Megakaryocytic leukemia

809

MANAGEMENT

- Platelet transfusions prn
- Monitor labs and coagulation values
- Withhold anticoagulation therapy if plt count <25,000/µL ⚠
- Observe for bleeding
  - Hemorrhage
  - Petechiae
  - Ecchymosis
  - Occult
  - Intracranial
  - Pericardial
  - Pulmonary
- Surgical or invasive procedure ensure plt count >50,000 µ/L ⚠
- Neurosurgical procedure ensure plt count >100,000 µ/L ⚠
- Education to maintain integrity
  - Avoid invasive procedures
  - Soft toothbrush
  - Electric razor
  - Avoid friction (sex)
  - Laxatives/stool softeners
  - Skin care
  - Avoid alcohol and over-the-counter medication
  - Safe environment

Olsen et al., 2019; ONS Clinical Interventions: Preventing Bleeding, 2019.

810

QUESTION

The most feared side effect of cancer experienced by patients is

A. pain.
B. alopecia.
C. fatigue.
D. nausea.

811

GI ALTERATIONS

- Nausea
- Vomiting
- Mucositis
- Diarrhea
- Constipation
- Xerostomia
- Dysphagia
- Interventions
  - Pharmacologic
  - Non-pharmacologic
  - Nutrition

812

CHEMOTHERAPY INDUCED NAUSEA & VOMITING PATHOPHYSIOLOGY

- Two major pathways activate vomiting center
  - Visceral and vagal afferent pathways of GI tract
  - Chemotherapy trigger zone (CTZ)
- **Chemotherapy and RT damage GI mucosa**
  - **Enterochromaffin receptor cells release serotonin (5-HT) which activates visceral afferent fibers in vagus nerve and induces impulses to areas of medulla during first 24 hours**
- **Substance P and neurokinin-1 (NK1) receptors**
  - **SP and NK1 receptors in the CTZ amply emetic message during delayed period after 24 hours**
- Neurotransmitters (dopamine and GABA) are also involved

813

RISK FACTORS DISEASE-RELATED

- Primary or metastatic tumor of CNS
- Delayed gastric emptying
- GI obstructions
- Food toxins
- Infection
- Motion sickness
- Metabolic abnormalities
  - Hyperglycemia
  - Hyponatremia
  - Hypercalcemia
  - Renal or hepatic dysfunction

814

RISK FACTORS TREATMENT-RELATED

- Chemotherapy emetogenicity
  - High
  - Moderate
  - Low
- Radiation therapy
  - Total body
  - Upper abdomen
- Obstruction, irritation or inflammation and delayed gastric emptying stimulated by GI tract
- Medication side effects
  - Opioids and narcotics
- Stimulation of receptors of inner ear
- Side effects of nutritional supplements
- Dehydration
- Surgery

815

RISK FACTORS PATIENT AND SITUATIONAL

- History of poor control with previous treatment
- Age 5-60 years
- Female
  - Lower response rates to antiemetics
- Pharmacogenomic differences with 5-HT3 receptor antagonists
- Anxiety and depression
- No history significant alcohol use
- Hyperemesis with pregnancy and/or motion-sickness
- Noxious odors or visual stimuli
- Conditioned anticipatory response
  - 75% chemotherapy patients

816

NAUSEA	SEVERITY
Grade 1	Loss of appetite
Grade 2	Oral intake decreased No significant weight loss or dehydration
Grade 3	Inadequate oral caloric or fluid intake TPN or feeding tube Hospitalization may be indicated
VOMITING	EPISODES IN 24 HOURS
Grade 1	1-2
Grade 2	3-5
Grade 3	>6 TPN or feeding tube Hospitalization may be indicated

817

2024 NCCN GUIDELINES

Type	HIGH (drug combination)	MODERATE (combination)	LOW (single agent)	BREAKTHROUGH
ACUTE	**5-HT$_3$RA** (max. dose 16mg) + **Steroid** dexamethasone + **NK-1 RA** aprepitant/ fosaprepitant/ netupitant/ rolapitant +/- **olanzapine**	**5-HT$_3$ RA** + **Steroid** **or** Olanzapine Palonosetron Dexamethasone **or** NK1 RA 5-HT$_3$ RA Dexamethasone	**steroid alone** or prochlorperazine/ metoclopramide or 5HT$_3$ antagonist **MINIMAL – no routine premed**	Evaluate and Individualize • add one agent from different class: •Olanzapine •Lorazepam •Phenothiazine •Cannabinoid •Haldol/metoclopramide •Scopolamine patch **•5-HT$_3$RA** **•Steroid** **AND** Change regimen to one higher level with next cycle
DELAYED	NK-1 antagonist + steroid +/- olanzapine Days 2-4	NK-1 antagonist + steroid or 5-HT$_3$ Days 2 & 3		Anticipatory Lorazepam 0.5-1 mg. PO (night prior to treatment & 1-2 hours prior to treatment)

NCCN Guidelines (Version 2.2024) Antiemesis.

820

TYPES OF NAUSEA AND VOMITING

- Acute - Within 24 hours
- Delayed - After 24 hours to 5 days
- Anticipatory - Prior to therapy (conditioned response)
- Breakthrough - Occurs despite antiemetic prophylaxis
- Refractory - Unresponsive to antiemetic therapy

818

QUESTION

L.T. is to receive doxorubicin (60 mg/m^2) and cisplatin (100 mg/m^2) therapy today. The oncology nurse knows that optimal antiemetic regimen includes

A. fosaprepitant and dexamethasone.
B. ondansetron, dexamethasone, and lorazepam.
C. palonosetron, dexamethasone, fosaprepitant, and olanzapine.
D. phenothiazine and ondansetron.

821

TYPES OF ANTIEMETIC DRUGS
NEUROTRANSMITTER RECEPTOR TARGETS

- **Serotonin** (5-HT3 receptor antagonists)
  - ondansetron
  - granisetron
  - dolasetron
  - palonosetron
- netupitant/palonosetron
- **Steroid**
  - dexamethasone
- **Neurokinin** (NK1 receptor antagonists)
  - aprepitant
  - fosaprepitant
  - rolapitant
- **Dopamine** (GABA D-2 antagonist)
  - prochlorperazine
  - Metoclopramide
- **Histamine** (H1 antagonists)
  - diphenhydramine
  - promethazine
- **Acetylcholine**
  - scopolamine
- **Cannabinoid** (CB-1 & CB-2)
  - dronabinol
  - nabilone
- **Anxiolytic & Antipsychotic** (D-2)
  - lorazepam
  - olanzapine

To prevent dyspepsia which mimic nausea:

- **Histamine** (H$_2$ blocker)
  - famotidine
  - ranitidine
- **PPI blocker**
  - omeprazole

Olsen et al., Chemotherapy Immunotherapy Guidelines, 2023

819

EBP
ONS

Recommended for Practice

- Follow NCCN guidelines
- Cannabis/Cannabinoids
- Dexamethasone
- Netupitant-palonosetron combination (NEPA)
- Neurokinin-1 Receptor Antagonist (NK1)
- Olanzapine
- Sustained release Granisetron
- Transdermal Granisetron
- Triple drug regimen

822

EBP
ONS 2019

Effectiveness Not Established

- Acupressure
- Aromatherapy
- Yoga
- Therapeutic touch
- Exercise
- Ginger
- Herbal medicine

823

MUCOSITIS OR ESOPHAGITIS

- Inflammation and ulceration of mucous membranes lining digestive tract
- Due to effects of:
  - Chemotherapy (anti-metabolites, antitumor antibiotics, alkylating agents, high-dose melphlan, bolus 5-FU)
  - Myelosuppression – Neutropenia
  - Infection
  - RT
  - GVHD
  - Oxygen therapy
  - Steroid therapy (fungal infections)
  - Other medications (opioids, phenytoin, anticholinergics e.g. diphenhydramine and tricyclic antidepressants)

Olsen et al., Chemotherapy Immunotherapy Guidelines, 2023

824

PATHOPHYSIOLOGY

- Drugs interfere with DNA, RNA or protein synthesis causing rapid destruction of cells
  - Small intestine proliferation rate is 4 days
- As marrow functions are suppressed, damage is greater
- Oral mucositis incidence
  - 20-40% standard-dose regimens
  - 60-70% patients undergoing HSCT
  - 100% of patients undergoing H&N radiation therapy

Olsen et al., Chemotherapy Immunotherapy Guidelines, 2023

825

RISK FACTORS
DISEASE OR PATIENT-RELATED

- GI tract tumors (primary or metastatic)
- Age <20 years
- Hematologic malignancies 2x3 higher incidence than solid tumor
- Prolonged neutrophil recovery time
- Impaired renal function
- Poor oral hygiene
- Genetic susceptibility
- History of alcohol and tobacco use
- Malnutrition and dehydration

Olsen et al., Chemotherapy Immunotherapy Guidelines, 2023

826

RISK FACTORS
TREATMENT-RELATED

- Chemo agents that affect DNA synthesis are the most toxic to the mucosa e.g. anti-metabolites, alkylating agents, antitumor agents, plant alkaloids
- Radiation therapy
  - Abdomen
  - Head and Neck
  - High dose or large field
  - TBI
- Graft-versus-host disease (GVHD)
- Targeted therapy – TKI, mTor inhibitors
- Immunotherapy agents – PD-1/PDL-1
- Drugs - oxygen, anticholinergics, phenytoin, and steroids

Olsen et al., Chemotherapy Immunotherapy Guidelines, 2023

827

QUESTION

Which of the following places the patient at risk for opportunistic infection?

A. Neutropenia
B. Lymphopenia
C. Thrombocytopenia
D. Anemia

828

CLINICAL MANIFESTATIONS

- Signs & symptoms evident 4 – 5 days following standard-dose chemotherapy
- Changes:
  - Color: pallor, erythema, white patches, lesions
  - Moisture
  - Taste and odor
  - Cracks, fissure, ulcers or blister
  - Swallow, pain (burning/stinging), and voice changes
- BMT patients experience mucositis 3-5 days following conditioning regimen
  - Neutropenic patients develop ulcerations infected by *Candida*
- Evident during 1-2 weeks of head and neck RT

Olsen et al., Chemotherapy Immunotherapy Guidelines, 2023

829

QUESTION

E.J. is experiencing severe stomatitis. Which tool is recommended to best obtain subjective data?

A. Nebraska Oral Assessment Guide.
B. Patient-reported Oral Mucositis Symptom scale.
C. World Health Oral Toxicity scale.
D. NCI Common Terminology Criteria for Adverse Events scale.

830

MUCOSITIS ASSESSMENT

Grade	Description
1	Asymptomatic or mild symptoms; intervention not indicated
2	Moderate pain or ulcers, not interfering with oral intake; modified diet indicated
3	Severe pain, interfering with oral intake
4	Life-threatening consequences; urgent intervention required

Olsen et al., Chemotherapy Immunotherapy Guidelines, 2023

831

QUESTION

A teaching point for Alice to best manage mucositis based on best scientific evidence includes use of a(n)

A. sucralfate.
B. magic mouthwash.
C. oral irrigation system.
D. oral care protocol.

832

ONS EBP - PREVENTION

- **Oral Care Protocol**

- Cryotherapy or ice chewing
  - For bolus 5-FU and Melphalan

- Low-level laser therapy
  - HSCT
  - Head and Neck cancer therapy
- Sodium bicarbonate mouth rinses

Olsen et al., Chemotherapy Immunotherapy Guidelines, 2023

833

MUCOSITIS TREATMENT

- Mouth hygiene is key!
  - Soft toothbrush and floss twice daily
  - Sodium bicarbonate mouth rinse
- Supportive Care Pain Medication
  - Opioids
    - Patient controlled analgesic (PCA) pump for HSCT population
    - 0.2% oral morphine rinse (swish and spit)
  - Adjuvant agents
    - 0.5% doxepin mouthwash
    - Benzydamine (NSAID) mouthwash
- Nutritional support with high protein foods and hydration
- Antifungals for candidiadis prevention or treatment

Olsen et al., Chemotherapy Immunotherapy Guidelines, 2023

834

QUESTION

A laboratory value to accurately measure malnutrition and nutritional risk in a patient with cancer is

A. albumin.
B. prealbumin.
C. red blood cell count.
D. neutrophil count.

835

ANOREXIA CAUSES

- Concurrent symptoms of nausea and vomiting, early satiety, diarrhea, constipation, pain, dysphagia, mucositis, ascites, altered taste or smell
- Structural problems of GI tract
- Metabolic imbalance – hypercalcemia, hypokalemia, uremia, hyponatremia
- Medications – opioids, antibiotics and iron
- Treatment-related effects – chemotherapy, RT, surgery and biotherapy
- Serotonin may have appetite suppression effect
- Increased lipids and lactic acid caused by tumor metabolism decreases appetite

836

ANOREXIA ASSESSMENT

GRADE	DESCRIPTION
1	Loss of appetite without alteration in eating habits
2	Oral intake altered without significant weight loss or malnutrition; oral nutritional supplements indicated
3	Associated with significant weight loss or malnutrition (e.g. inadequate oral caloric and/or fluid intake) ;tube feedings or TPN indicated
4	Life-threatening consequences; urgent intervention required

CTCAE, v5.0, 2017

837

QUESTION

Which of the following cancer types are associated with cachexia?

A. Lung and pancreatic
B. Breast and ovarian
C. Leukemia and lymphoma
D. Malignant melanoma and gastric cancer

838

ALTERATION NUTRITION

- Cachexia – a syndrome of progressive wasting associated with anorexia and metabolic alterations
  - > 10% weight loss
- 80% patients with late-stage disease
- May lead to delay in therapy and delivery of oncology therapy
- Results in abnormalities of carbohydrate, protein and fat metabolism (negative nitrogen balance)
- Leads to compromised immune function and delayed bone marrow production
- Visceral and lean body mass depletion leads to muscle atrophy, visceral organ atrophy, hypoalbuminemia & anemia

Eggert, 2022

839

CACHEXIA RISK FACTORS

- Physical response to disease
- Metabolic disturbances – hypercalcemia, tumor lysis syndrome, hypokalemia
- Treatment-related side effects – chemo, RT, surgery & biotherapy
- Other medication side effects – opioids, antibiotics and iron
- Anxiety, depression, fear or distress

Eggert, 2022

840

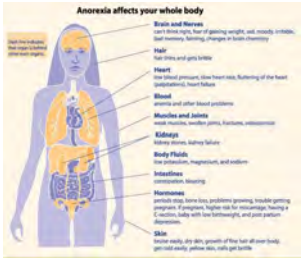
EBP - ANOREXIA

Recommended for Practice

- Oral nutritional interventions
  - Education
  - Protein calorie supplements
  - Vitamin and mineral supplements

Likely to be Effective

- Systemic corticosteroids
- Olanzapine



ONS, Symptom Intervention Resource: Anorexia, 2024,

841

ALTERATION IN NUTRITION MANAGEMENT

- Monitor weights
- Calorie count
  - Food diary
- Diet alterations
  - Increase protein
  - Avoid irritating foods
  - **Cool/cold foods**
  - Supplements
- **Small frequent feeding**

ONS, Symptom Intervention Resource: Anorexia, 2024.

842

QUESTION

M.T. is receiving combination therapy of fluorouracil and radiation for colorectal cancer. Which of the following side effects is he most at risk for developing?

A. Peripheral neuropathy
B. Constipation
C. Thrombocytopenia
D. Diarrhea

843

DIARRHEA RISK FACTORS

- Disease-related – bowel obstruction, bacteria or viruses, GVHD, neuroendocrine tumors, food intolerance or allergy
- Treatment-related – surgical resection, RT, immunotherapy, chemotherapy, medications, nutritional supplements or fecal impaction
- Lifestyle – stress & anxiety, change in dietary habits or foods containing natural laxative properties

844

DIARRHEA ASSESSMENT

GRADE	DESCRIPTION
1	Increase of <4 stools/day over baseline; mild increase in ostomy output compared to baseline
2	Increase of 4-6 stools/day over baseline; moderate increase in ostomy output compared to baseline
3	Increase of ≥7 stools/day over baseline; incontinence; hospitalization indicated; severe increase in ostomy output compared to baseline; limiting self-care ADL
4	Life-threatening consequences; urgent intervention indicated

CTCAE, 5.0, 2017

845

DIARRHEA MANAGEMENT

Chemotherapy-induced

Likely to Be Effective

- Loperamide Hydrochloride
  - 4 mg then 2 mg q4hr
- Octreotide therapy
  - Hormone inhibitor therapy octreotide
  - 150 mcg SC TID x 5 days
  - Severe diarrhea: octreotide depot 30 mg IM q7-14 days prior to chemotherapy then monthly (up to 6 doses)
- Probiotics

Expert Opinion

- BRAT diet
- Oral nutritional interventions

Radiation Therapy-Induced (pelvic irradiation)

Recommended for Practice

- Loperamide
- Probiotics

Likely to be Effective

- Psyllium Fiber

ONS, Symptom Intervention Resource: Chemotherapy-induced Diarrhea, 2024,
ONS, Symptom Management, Radiation-induced Diarrhea, 2024.

846

ONS EBP DIARRHEA MANAGEMENT

Immunotherapy-induced

Likely Effective

- Antidiarrheals for low-grade diarrhea
- Infliximab for unresolved or refractory diarrhea
- Steroids for moderate to severe diarrhea
- Vedolizumab for unresolved or refractory diarrhea

Not Recommended for Practice

- Budesonide prophylaxis

ONS, Symptom Intervention Resource: Immunotherapy-Induced Diarrhea, 2024

847

EBP - OTHER MANAGEMENT

- IVF
  - Electrolyte monitoring and replacement
- Decompression or surgery for obstructions
- Modify or hold chemo and/or RT, supplements; d/c meds
- Treat *c. difficile* or GVHD
- Dietary modifications – d/c dairy, fat, spices
- Educate patient to report S&S dehydration
  - Daily weights – monitor loss > 1-2% per week

Eggert, 2022

848

QUESTION

An agent specifically recommended for relief of opioid-induced constipation is

A. ducusate.
B. methylnaltrexone.
C. bisacodyl.
D. polyethylene glycol.

849

CONSTIPATION TYPES

- Primary – extrinsic factors that slows peristalsis
  e.g. immobility, lack of time or privacy, and low-fiber diet
- Secondary – pathologic processes
  e.g. bowel obstruction, spinal cord compression, hypercalcemia, hypokalemia and hypothyroidism
- Iatrogenic – medication-related
  e.g. opioids, chemotherapy, anticonvulsants or psychotropics

850

RISK FACTORS DISEASE-RELATED

- Internal or external obstruction by tumor
- Anorexia, fluid and electrolyte imbalances
- Decreased activity and immobility
- Spinal cord compression - T8-L3
- Ascites
- Neurologic disorders e.g. stroke, idiopathic intestinal nerve disorders
- Systemic disorders e.g. amyloidosis, lupus or scleroderma

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851

RISK FACTORS TREATMENT-RELATED

- ANS neuropathy from vinca alkaloids
- Medications - opioids, anticonvulsants, psycotropics, antiemetics (ondasetron), and antacids
- Nutritional deficiencies, decreased fiber and fluid intake
- Electrolyte imbalance due to therapy
- Surgery- manipulation of intestines

Eggert, 2022

852

ONS SYMPTOM INTERVENTION CONSTIPATION MANAGEMENT

Opioid-induced Constipation - Recommended for Practice
- Osmotic laxative
  - Polyethylene Glycol
  - Magnesium citrate
- Stimulant laxative (senna and docusate)

Persistent Constipation
- Methylnaltrexone (*Relistor –peripherally-acting opioid reversing agent)*
- Naldemedine
- Naloxegol

Non-opioid Constipation - Likely to Be Effective
- Antiemetics
- Decreased oral intake
- Physical activity

Insufficient Evidence
- Acupuncture
- Electroacupuncture combined with lifestyle education

ONS, Symptom Intervention Resource: Constipation, 2020

853

CONSTIPATION MANAGEMENT

- Surgical correction of obstructions
- Correct fluid and electrolyte imbalances
- Bowel regimen ⚠
  - Provide information laxative dependence
    - Teach fluid intake, dietary control and physical activity
  - Required with opioids or vinca alkaloid therapy
- Monitor for impaction (decreased bowel sounds, absent or decreased bowel sounds, distention, loss of appetite)
  - Avoid rectal exam if neutropenic and thrombocytopenic

Eggert, 2022

854

QUESTION

Which of the following patients is at highest risk of ascites?

A. Sara, a 50-year-old with ovarian cancer.
B. Luke, a 62-year-old with lung cancer.
C. Eva, a 27-year-old leukemic.
D. Tom, a 59-year-old head and neck with cancer.

855

MALIGNANT PERITONEAL EFFUSION ASCITES

- Only 50-20 ml fluid bath organs and bowel surfaces
- 50-100 ml/hr diffuses from serum to peritoneum, back to circulation via lymphatics

High-risk diagnoses include
- Ovarian (30-54% cases)
- Cervical
- Endometrial
- Breast
- Lung
- Pancreatic
- Colorectal and GI cancer
  - includes gastric lymphomas
- Testicular
- Sarcoma
- Mesothelioma

Eggert, 2022

856

ASCITES ASSESSMENT AND TREATMENT

- **Ascites mini-scale (1-5) for ovarian cancer**
  - SOB, distended abdomen, reduced mobility, fatigue, loss of appetite
- Ultrasound detects ≥ 100 cm^3 fluid
- Ascites cytology (gold standard) to detect malignant cells
- Treat underlying cause
- Systemic chemotherapy for active disease
  - Intraperitoneal chemotherapy for select patients
- Paracentesis (results in protein depletion & re-accumulation)
- Peritovenous shunting (Denver/LeVeen Shunt) or drain placement

Eggert, 2022

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ASCITES NURSING INTERVENTIONS

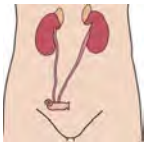
- Maintain high Fowler position
- Self-monitoring weight and abdominal girth
- Avoid restrictive clothing
- Routine paracentesis or PleurX® drain for chronic ascites, and/or chemotherapy
- Non-pharmacologic techniques – relaxation, imagery, music, distraction, healing touch
- Encourage palliative care consult if no relief from chemotherapy

Olsen et al., 2019

858

GU ALTERATIONS

- Urinary Incontinence
- Urgency
- Bladder Spasms
- Urostomy
- Kidney Damage



859

INCONTINENCE PREVENTION & TREATMENT

- Bladder retraining
- Avoid caffeine and alcohol
- Kegel exercises to strengthen bladder tone (3 sets of 10/day)
- Surgical treatment e.g. artificial sphincters, diversions, or suspensions
- Nerve sparing prostatectomy
- Intermittent self-catheterization or external catheter drainage system
- Foley catheters for end-stage disease

Eggert, 2022

860

CARDIAC TOXICITY RISK FACTORS

- Age <15 or advanced age > 65
- Female
- Preexisting heart disease, HTN, hyperlipidemia
- Pulmonary disease (COPD)
- Cigarette use
- Obesity
- Hepatic or renal dysfunction
- Combination therapy
  - RT and anthracycline agents
- Previous cardiotoxic cancer therapy
- Mediastinal RT >30 Gy or daily RT doses >2 Gy/day
- Cumulative doses
  - Doxorubicin >550 mg/m^2)
  - Liposomal doxorubicin >900 mg/m^2
  - Epirubicin >720 mg/m^2
  - Mitoxantrone >120 mg/m^2
  - Idarubicin >90 mg/m^2
- Platinum agents
- Antimetabolites
- Taxanes
- Her2 -based therapy
- Bevacizumab therapy
- Tyrosine kinase inhibitors
- mTor inhibitors
- Antiandrogens and antiestrogens
- Longer duration of survival

Eggert, 2022; Kirk, D. & Towell-Barnard, A. (2024). Cardiovascular Symptoms. In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses*) (7th ed.)

861

CARDIAC FUNCTION DIAGNOSIS

- Acute may occur at start of therapy but is rare
  - Symptoms resolve once therapy d/c
- Late onset after 1 year of treatment most common

Symptoms: vague and subjective
- SOB
- Chest heaviness
- Excessive fatigue
- Cardiac toxicity

Physical Exam
- Tachycardia
- Neck vein distention
- Gallop rhythm
- Friction rub
- Peripheral edema

Eggert, 2022; Kirk, D. & Towell-Barnard, A. (2024). Cardiovascular Symptoms. In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses*) (7th ed.)

862

QUESTION

Cardiac toxicity is indicated with an ejection fraction of

A. 60%
B. 70%
C. 45%
D. 50%

863

CARDIAC TOXICITY DIAGNOSIS

- ECG changes
  - PAC, PVC ST-T wave changes
- MUGA changes
  - EF <45% or more than 5% ↓ baseline (d/c chemo)
- Pericardial effusion
- LV hypertrophy
- Cardiac MRI - gold standard
- Body Mass Index or waist circumference
- Lab changes
  - K+, Mg+, Ca, renal function, BNP, lipid levels, Q-T

Eggert, 2022; Kirk, D. & Towell-Barnard, A. (2024). Cardiovascular Symptoms. In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses*) (7th ed.)

864

QUESTION

When a patient's ejection fraction is 45% and the curative treatment plan includes doxorubicin, the nurse should expect

A. an order for dexrazoxane.
B. a decrease in the dose of a cardiotoxic agent.
C. close monitoring of patient with telemetry.
D. an increase in intravenous fluids.

865

CARDIAC TOXICITY PREVENTIVE MEASURES

- Refinement RT techniques to chest area
  - Shielding & reducing treatment field
- Liposomal chemotherapy
  - Liposomal doxorubicin (Doxil®)
- Cardioprotectant
  - Dexrazoxane
- Less cardiotoxic agents
  - Epirubicin
- Weekly dose of cardiotoxic chemo vs. q3wks
- Document cumulative doses
- Studies: Monitor cardiac triponins & BNP, MUGA scan, interval ECG

Eggert, 2022; Kirk, D. & Towell-Barnard, A. (2024). Cardiovascular Symptoms. In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses*) (7th ed.)

866

CARDIAC TOXICITY TREATMENT

- Supportive care
- Conservation energy education
- Fluid retention management
- Low sodium diet
- Oxygen
- Diuretics
- Smoking cessation
- Cardiac medications
  - ACE-inhibitors
  - Beta-blockers
  - Digitalis

Eggert, 2022; Kirk, D. & Towell-Barnard, A. (2024). Cardiovascular Symptoms. In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses*) (7th ed.)

867

PULMONARY FUNCTION DIAGNOSIS

- CXR – interstitial infiltrates
- PFT's – restrictive patterns & fibrosis
- High resolution CT Chest – pulmonary damage
  - Early: diffuse haziness, ground glass
  - Late: infiltrates and dense consolidation
- ABGs – hypoxia

Symptoms:
- Progressive SOB
- Low-grade fever
- Excessive fatigue
- Nonproductive cough
- Tachypnea
- Decreased to absent breath sounds
- Hypoxia
- Cyanosis (late)

Eggert, 2022

868

QUESTION

Which class of agents is used to decrease local inflammation in a patient with dyspnea?

A. Bronchodilators
B. Glucocosteroids
C. Antibiotics
D. Diuretics

869

EBP - DYSPNEA

Recommended for practice
- Immediate release opioids (systemic)

- Likely to be Effective
  - Oxygen
  - Fan/increasing airflow
  - Oral nutritional interventions
  - Psychoeducation/psychoeducational interventions
    - Transmucosal fentanyl
- Benefit balanced with Harm
  - Pleural catheter
  - Plurodesis
  - Exercise
- Not Recommended
  - Palliative oxygen

ONS, Symptom Intervention Resource:Dyspnea 2019

870

QUESTION

The nurse is preparing a teaching plan for the family of an elderly client with lung cancer who lives alone. What would be the priority for client safety and optimal outcomes?

A. Activity prioritization
B. Medication management and emergency care
C. Signs and symptoms to report to the physician
D. Discussion on cognitive changes to be expected

871

NEUROLOGICAL ALTERATIONS

- May be related to chemotherapy or other therapies
- Preexisting neuropathies due to diabetes, HIV, infection and vitamin B deficiency

Management: Likely to be Effective

- Peripheral Neuropathy
  - Duloxetine
  - Gabapentin and opioid combination
- "Chemo Brain"
  - Cognitive Training - group
    - Memory and adaptation training

ONS, Symptom Intervention Resource: Peripheral Neuropathy, 2019

872

QUESTION

Which nursing intervention should be used to support and communicate with a patient who is cognitively impaired and receiving chemotherapy?

A. Call the patient by a term of endearment when addressing him or her.
B. Identify the patient using the identification band.
C. Identify yourself and give a simple explanation to the patient.
D. Avoid touching the patient to decrease the risk of anxiety.

873

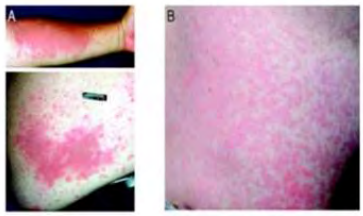
DERMATOLOGIC ALTERATIONS

- 90% oncology patients
- EGFR rash
- Immune-related adverse effect (irAE)
- Hyperpigmentation
- Radiation recall
  - 8 days to15 years after RT
- Hand-foot syndrome
  - **palmar-plantar erythrodysesthesia – (PPE)**
- Alopecia or thinning
- Nail changes

Eggert, 2022

874

IMMUNE-RELATED ADVERSE EFFECT



875

DERMATOLOGIC IMMUNE-RELATED ADVERSE EFFECTS

- Most are low grade
- Rash
- Pruritis
- Vitiligo
- Most resolve with symptomatic therapy
  - Moisturizers
  - Diphenhydramine
  - Hydroxyzine
  - Steroids (watch for flare)
- T-cell infiltrates seen on biopsy specimens of the skin

876

RADIATION RECALL

- Bleomycin
- Doxorubicin
- 5-FU
- MTX
- Dactinomycin
- Gemcitabine

AGENTS

- Symptomatic treatment
  - Systemic steroids
  - Topical mupirocin (Bactroban)
- Schedule treatments to avoid toxicity

MANAGEMENT

877

EGFR TOXICITY GRADING SCALE

- Grade 1 - Mild
  - Macular or papular rash
- Grade 2 – Moderate
  - Macular or papular with pruritis & may interfere with ADL
- Grade 3 – Severe
  - Generalized erythroderma, macular, papular or vesicular eruption
- Grade 4 – Severe
  - Ulcerative or blistering skin toxicity

CTCAE 5.0, 2017

878

EGFR RASH

- Cetuximab
- Erlotinib
- Affinitor
- Lapatinib
- Gefitinib
- Nivolumab
- Ipilimumab
- Pembrolizumab

AGENTS

- Mild soap
- Protective sun cream
- Emollients
- Colloidal oatmeal lotion

Grade 1-3

- Clindamycin gel
- Steroid cream for mild – moderate
  - Oral steroids for severe
- Tetracycline analogues
  - Minocycline
  - Doxycycline

MANAGEMENT

ONS, 2017-2019

879

EBP - CUTANEOUS REACTIONS

Likely to Effective

Skin Rash

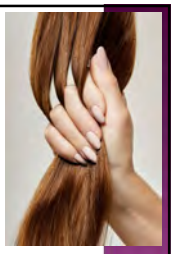
- Dose interruption or modification
- Antibiotics – systemic for prophylaxis

EGFR - Nail Toxicity

- Urea-based moisturizer for kinase Inhibitor-induced nail toxicity

880

ALOPECIA



- 60-90% hair follicles are replaced q24hr
  - 90% hair follicles are in growth phase
- Can involve all areas of the body
- Usually transient
- Incidence
  - Chemotherapy - 65%
  - Molecular targeted agents e.g. cetuximab
  - Tyrosine kinase inhibitors e.g. sorafenib, sunitinib
  - High dose chemotherapy (BMT) – irreversible
  - Radiation – 2 Gy single fraction or 40 Gy

881

ALOPECIA

- Begins 2 weeks after initiation of chemo
- May continue for 2 months after last dose
- Regrowth starts 6-8 weeks after completion of treatment
- Complete regrowth may take 1-2 years
- Color, shade and texture may change

- Radiation
  - Begins 2-3 weeks after first treatment
  - Regrowth 3-6 months post-RT

- Grade 0 – no alopecia
- Grade 1 – minimal
- Grade 2 – moderate patchy loss
- Grade 3 – complete loss but reversible
- Grade 4 – complete loss but irreversible

882

ALOPECIA TREATMENT

- Scalp cooling prior to chemotherapy
- Positive results with anthracyclines and taxanes

883

ALOPECIA PATIENT EDUCATION

- Protect scalp from sun and cold
- Wear sunscreen
- Wear sunglasses in bright sun
- Use eye drops
- Use mild shampoo
  - Restrict hair washing 2x/week
- avoid blow-drying, hair dyes
- Resources
  - American Cancer Society www.cancer.org
  - CancerCare www.cancercare.org
  - Tender Loving Care www.tlcdirect.org

884

QUESTION

A chemotherapy agent know to cause palmar-plantar erythrodysesthesia is

A. capecitabine.
B. paclitaxel.
C. cytarabine.
D. vincristine.

885

PPE – HAND/FOOT SYNDROME

Agents

- Liposomal doxorubicin
- Capecitabine
- Sorafenib
- BRAF inhibitors
  - vemurafenib
  - dabrafenib
  - encorafenib

Management

- Dose adjustment or discontinuation
- Emollient therapy
- Avoid pressure to palms and soles
- Topical steroids

886

QUESTION

Palmar-plantar erythrodysesthesia is likely a result of

A. decreased renal clearance of the drug.
B. pressure and friction on hands and feet.
C. increased circulation of drug.
D. vasodilation of peripheral blood vessels.

887

QUESTION

Cancer-related symptoms that frequently cluster with fatigue include

A. pain, nausea, and vomiting.
B. sleep disturbances, and diarrhea.
C. depression, pain, and sleep disturbances.
D. hyperthyroidism and pain.

888

PAIN

- One of most feared symptoms
- 66.4% patients with advanced cancer
- 55% have pain during cancer treatment
- 39.3% have pain after curative treatment
- Highest incidence in advanced cancer
  - Head and neck, lung, and breast cancer
  - 1/3 moderate-severe pain
  - Racial & ethnic background may determine degree of effective pain control with breast cancer

Barriers

- Fear of addiction
- Tolerance to pain meds
- Opioid association with dying
- Provider-related
  - Side effect concerns
  - Ineffective dose prescribing
  - Poor control side effects
- System-related
  - Regulatory and legislative policies

Eggert, 2022;

889

QUESTION

The most common source of pain related to cancer is

A. bone metastases.
B. liver metastases.
C. pancreatic involvement.
D. nerve compression or injury.

890

PAIN CHARACTERISTICS

- Acute – well defined & temporary
  - Amenable to treating cause or with analgesics
  - less than 6 months
- Chronic – persists for more than 3 months
- Cancer pain – acute and chronic cancer-related pain associated with disease, procedures or treatment
  - Often clusters with fatigue, depression, anxiety and sleep disturbance
- Breakthrough – temporary flare in stable pain
- End-of-dose – pain increases prior to next scheduled dose
- May be r/t underlying illness or secondary to treatment-related sequelae
- Direct tumor invasion, from primary tumor or metastasis
- Treatment-related due to surgery or invasive procedures, RT, system therapy
  - e.g. chemo-induced neuropathy

Eggert, 2022

891

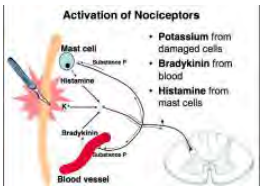
PAIN TYPES

- ***Somatic***
  - Pain from a source e.g. bone metastasis
  - Sharp, stabbing, throbbing or pressure
- ***Visceral***
  - Related to distention, compression or infiltration of thoracic or abdominal tissue e.g. pancreas, liver, GI tract
  - Diffuse, aching, cramping sensation
  - Poorly localized
- ***Neuropathic***
  - Peripheral or central NS
  - Burning, electric, shock-like or painful numbness
    - e.g. peripheral neuropathy, post-lobectomy or mastectomy pain

Eggert, 2022

892

PHYSIOLOGY



- Noxious stimulus activates nociceptors - afferent or ascending neurons that sense pain

Types of Nociceptors

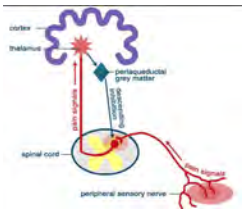
- Myelinated A fibers activated by thermal & mechanical stimuli
- Demyelinated C fibers activated by chemical stimuli in addition to thermal and mechanical

Eggert, 2022

893

PAIN PATHWAY

- Transduction
  - Neurotransmitters release prostaglandins, bradykinin, serotonin, substance P and histamine which initiates inflammation
- Transmission
  - Signal transmitted along nerve fibers to dorsal horn of spinal cord
  - Neurons transmits message to the thalamus, cerebral cortex & limbic system
- Modulation
  - Neurons of the brainstem descend to dorsal horn and release neuromediators – endogenous opioids, norepinephrine, serotonin
- Opioid receptors located in both ascending and descending pathways



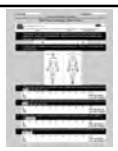
Eggert, 2022

894

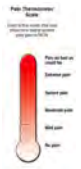
Domain	Pain Assessment
Physical	**WILDA** – words, intensity, location, duration, and aggravating/alleviating factors **PQRST** – provocation/palliation, quality, region/radiation, severity, timing **OLDCART** – onset, location, duration, characteristics, aggravating factors, relieving factors, treatment
Psychological	Meaning of pain History of anxiety, depression Coping Beliefs regarding opioids and addiction
Social	Functional assessment – interference with ADL Family caregiver support Economic impact with cost of analgesics
Spiritual/Existential	Spiritual beliefs related to pain and illness Influence of religion or spirituality on coping with pain Meaning of suffering

895

PAIN ASSESSMENT



- **Adult**
  - Analogue scale 0-10
  - **Patient Reported symptoms** (Edmonton Symptom Assessment Scale)
  - Symptom cluster e.g. fatigue, insomnia & depression
- **Older Adult activities,**
  - Visual analog scales
- **Non-verbal**
  - FLACC scale – **F**ace, **L**egs, **A**ctivity, **C**ry & **C**onsolability
- **Substance Use Disorder**
  - 5 A's – **A**nalgesic response, **A**DLs, **A**dverse events, **A**berrant activities suggesting misuse, abuse, or addiction, and **A**ffect



Eggert, 2022

896

QUESTION

A safety concern for patients with peripheral neuropathy is

A. pain caused by blankets on the feet at night.
B. inability to keep feet warm.
C. risk for falls due to sensory changes.
D. the impact on quality of life.

897

PAIN MANAGEMENT

- **WHO 3-Step tailored approach**

Pharmacologic Interventions

- NSAIDs
- Opioids
  - Cornerstone
  - Long- + Short-acting
- Misc. Opioids - Fentanyl
- Tricyclic antidepressants
- Anti-convulsants

- Start with oral route, change routes or rotation of opioids if AE or intractable pain despite dose escalation
- Bowel regimen, antiemetics, H_2 antagonists, CNS stimulant to decrease sedation

Non-pharmacologic Interventions

- Pain is an individual experience
  - emotional & psychological state can greatly impact the ability to relieve pain
- OT & PT
- Acupuncture
- Acupressure
- Heat or cold
- Complementary therapies

Eggert, 2022

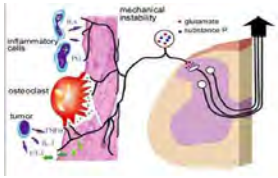
898

ONS - PAIN MANAGEMENT ACUTE PAIN

Recommended for Practice

- Epidural analgesic
- Local analgesic infusion

- Likely to be Effective
  - Gabapentin
  - Hypnosis/hypnotherapy
  - Music/music therapy
  - Naproxen for CSGF bone pain
  - Tramadol
  - Paracoxib
  - Nefopam (NSAID)
  - Topical anesthetics
  - Intraspinal analgesics



ONS, Symptom Intervention Resource: Acute Pain, 2019

899

ONS - PAIN MANAGEMENT CHRONIC PAIN

Recommended for Practice

- Anesthetics-systemic
- Bone-modifying agents
- Celiac plexus block
- Extended- and sustained-release opioids
- Gabapentin combinations
- Methadone
- NSAIDS
- Oxycodone/naloxone
- Radiation Therapy
- Tapentadol
- Tramadol
- Transdermal Buprenorphine
- Transdermal fentanyl

ONS, Symptom Intervention Resource: Chronic Pain, 2019

900

ONS - PAIN MANAGEMENT BREAKTHROUGH

Breakthrough

- Opioids proportional to basal dose (10-20% of 24 hr dose) except fentanyl
- Transmucosal opioids
  - Oral fentanyl spray, buccal fentanyl & transmucosal fentanyl

Refractory/Intractable

- Intraspinal therapy
  - Injections or implanted devices/infusion devices

ONS, Symptom Intervention Resource: Breakthrough Pain, 2019

901

PAIN INTERVENTIONAL METHODS

- Neurolytic blocks – celiac plexus & hypogastric
  - Alcohol
  - Phenol
- Spinal analgesia
- Vetebroplasy & kyphoplasty
- Radiofrequency Ablation
- Bisphosphonates
- Radiation therapy
- Radioisotopes
  - Strontium-89
  - Samarium-153
  - Radium-223
- Surgery
- Chemotherapy

Eggert, 2022

902

PAIN MANAGEMENT

Not recommended

- Meperidine
- Propoxyphere
- Codeine

- Principles
  - Initial dose is dependent on severity & agent
  - **NO maximum dose/ceiling**
  - **Titrate daily**
    - 50-100% long-acting + breakthrough
  - **Taper down 25-50% each day if pain resolving**

Eggert, 2022

903

NEUROPATHIC PAIN

- Cancer
- Post herpetic neuralgia
- Spinal cord compression
- Hepatic or neurologic diseases
- Pre-existing neuropathies
  - Diabetes
  - HIV
  - Infection
  - Vitamin B deficiency
- High-dose chemotherapy
- Radiation therapy
- Age > 60 yr
- Pre-existing neuropathy related to RT

Disease-related Factors | **Treatment-related Factors**

904

PERIPHERAL NEUROPATHY SYMPTOMS AND MANAGEMENT

- Tingling of fingers, toes, jaw pain, foot drop, muscular atrophy
- Stocking-glove distribution
- Maximize safety
  - **Protect hands and feet from cold**
  - **Avoid tight clothing**
  - **Wear gloves for gardening**
  - **Teach inspection for burns, cuts, abrasions**
  - **Infusion rates paclitaxel – longer duration decreases PN**
- PT & OT consult
  - **Use of assistive devices**

Likely to Be Effective

- Duloxetine
- Gabapentin and opioid combination

EBP, ONS 2019

905

QUESTION

Pharmacologic interventions for pruritus include

A. ketamine and dexamethasone.
B. gabapentin and clonidine.
C. alprazolam and corticosteroids.
D. corticosteroids and capsaicin.

906

PRURITUS

C fibers stimulate afferent pathway by histamine, prostaglandins, substance P, cytokines, serotonin, opioids or physical stimuli (electricity, pressure or temperature)	Like physiology of pain
Pharmacologic agents	Diphenhydramine Cimetadine Corticosteroids Nalaxone and methylnltrexone Capsaicin Aprepitant Mirtazapine
Non-pharmacologic methods	Room temperature cool with humidity at 40% or higher Cotton clothing Hydration Moisturize skin Avoid scratching

907

QUESTION

In which treatments has fatigue become a dose-limiting side effect?

A. Agents that cross blood-brain barrier
B. Immunotherapy or biotherapy
C. Hormone therapy
D. Radiation therapy

909

FATIGUE PHYSIOLOGY

- New theories suggest release of cytokines, interleukins, TNF, vascular endothelial growth factor (VEGF)
- May be related to
  - Treatment – Immunotherapy/biotherapy, chemotherapy, RT, hormone therapy, surgery or medications
  - Symptom cluster of pain, distress or sleep disturbances
  - Anemia and shortness of breath
  - Lifestyle – Decreased activities or emotional distress

908

QUESTION

Melatonin released by the pineal gland

A. mediates night and day rhythms.
B. increases with age.
C. increases during the daylight hours.
D. increases with menopause.

911

SLEEP-WAKE DISTURBANCES

- Affects 30-75% oncology patients
- Circadian rhythm disruptions & low melatonin levels
  - Associated with depression & insomnia
  - Decreased melatonin level associated with breast cancer (especially night workers)
  - Melatonin inhibited by light
- Disease-related factors
  - Prior to diagnosis
  - Concurrent with pain, nausea, fatigue & depression
- Treatment-related factors
  - Immunotherapy/biotherapy
  - Chemotherapy
  - Steroids and hormonal therapies
  - Analgesics, antidepressants, antiemetics, benzodiazepines, steroids, hypnotics

912

FATIGUE ASSESSMENT & INTERVENTIONS

- Patient self-report is gold standard
  - Numeric scale or mild/moderate/severe
- Focused history & physical exam
- Laboratory tests (Hgb, electrolytes, thyroid function, vitamin D level, iron, folate, vitamin B12)

Recommended for Practice
- Exercise

ONS, Symptom Intervention Resource: Fatigue, 2017

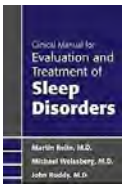
910

RISK FACTORS

- Life-style Factors
  - Sleep hygiene practices: daytime naps, use of caffeine and nicotine, lack of exercise, lack of sleep routine
- Psychological – anxiety, depression, stressors, psychiatric disorders
- Older age
- Menopause
- Environment
  - Temperature (60-67F ideal)
  - Exposure to light
- Lung or breast cancer diagnosis

913

INTERVENTIONS



Recommended for Practice

- Cognitive therapy

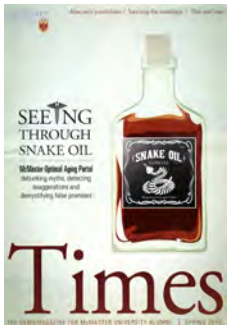
Likely to be Effective

- Exercise
- Mindfulness-based Stress Reduction

EBP, ONS 2019

914

COMPLEMENTARY & INTEGRATIVE MODALITIES



915

A SHORT HISTORY OF MEDICINE

- 2000 B.C. - "Here, eat this root."
- 1000 A.D. – "That root is heathen. Say this prayer."
- 1850 A.D. – "That prayer is superstition. Drink this potion.
- 1940 A.D. – "That potion is snake oil. Swallow this pill."
- 1985 A.D. – "That pill is ineffective. Take this antibiotic."
- 2020 A.D. – "That antibiotic doesn't work anymore. Here, eat this root."

Author Unknown

916

COMPLEMENTARY & INTEGRATIVE MODALITIES INTRODUCTION

- ~62.5% of cancer patients use some form
- Most used in US
  - Nutritional supplements – calcium, multivitamins, Vitamin D and probiotics
  - Whole-medicine systems e.g. chiropractic and osteopathic
  - Mind-body approaches e.g. meditation and yoga
- Academic and private cancer centers offer range of integrative therapies

Dweikat, T. A., Complementary and Integrative Modalities.(2024). In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses* (7th ed.). pp. 351-359.

917

USE OF COMPLEMENTARY & INTEGRATIVE MEDICINE (CIM)

- Nursing assessment must include questions directed at determining use
  - Document all therapies used
- Encourage open communication
- Use may reflect cultural preferences
  - Support patient's right to choose
- Use may negatively interfere or interact with chemotherapy, new therapies and cellular therapy
  - Suggest avoidance of all herbs/supplements with immunotherapies/small molecular therapies
  - Docetaxel interacts with garlic supplement, St. John's Wort, and echinacea

Dweikat, T. A., Complementary and Integrative Modalities.(2024). In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses* (7th ed.). pp. 351-359.

918

CLASSIFICATION DEFINITIONS

- ***Alternative Therapy -*** modality used instead of conventional medicine are virtually unregulated
- ***Complementary Therapy -*** supplement or enhance conventional medicine
  - Acupuncture
  - Herbal/botanicals
  - Mind-body therapies
  - Energy therapy
- ***Integrative Medicine, Integrative Health Care and Integrative Oncology –*** combines complementary with conventional treatment

Dweikat, T. A., Complementary and Integrative Modalities.(2024). In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses* (7th ed.). pp. 351-359.

919

ALTERNATIVE WHOLE MEDICAL SYSTEMS

- Ayurveda – rebalancing and restoring energy flow
  - India – herbal compounds, metals & minerals
- Chiropractic medicine – structural alignment of spine
  - ***Contraindicated for bone metastasis, spinal cord compression, thrombocytopenia or venous thrombus*** ⚠
- Homeopathy - administration of healing substances
- Osteopathic medicine – conventional medicine combined with focus on body structure and function
- Traditional Chinese medicine (TCM) – herbs, acupuncture and other methods (cupping, mind-body therapy)

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920

NIH CLASSIFICATION

- NIH - National Center for Complementary and Integrative Health
  - Established in 1991

- Two subgroups
  - ***Natural Products***
    - Herbs
    - Vitamins
    - Minerals
    - Probiotics
  - ***Mind and body practices***
    - Yoga
    - Chiropractic and osteopathic medicine
    - Meditation
    - Massage
    - Acupuncture
    - Relaxation therapy
    - Tai chi
    - Qi gong
    - Healing touch
    - Hypnotherapy
    - Movement therapies

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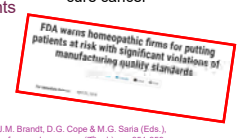
921

CIM CATEGORIES

- 8 categories
  - Alternative medical systems
  - Energy therapies
  - Exercise therapies
  - Manipulative & body-based methods
  - Mind-body interventions
  - Nutritional therapeutics
  - Pharmacologic and biologic treatments
  - Spiritual therapies

FDA warning 2019 – use of "miracle mineral" to cure cancer



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922

CIM MANIPULATIVE & BODY-BASED PRACTICE

- Acupuncture
- Acupressure
- Alexander technique
  - movement & touch
- Aromatherapy
  - essential oils
- Cranial osteopathy
  - skull realignment
- Dance therapy
- Feldenkrais method
  - posture & flexibility
- Lymphatic drainage
- Massage
- Qigong
  - posture & breathing
- Shiatsu
  - like acupressure
- Trigger point therapy

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923

CIM MIND-BODY MODALITIES

- Art therapy
- Color therapy
- Eye movement desensitization & reprocessing
- Guided imagery
- Meditation
- Music therapy
- Neurolinguistic programming (NLP)
- T'ai Chi
- Yoga

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924

CIM
BIOLOGICALLY-BASED PRACTICES

- Biofeedback
- Herbal therapy
- Hydrotherapy
- Nutritional counseling
- Energy work – biofield therapy
  - Reiki
  - Therapeutic Touch
  - Healing Touch
- Magnetic therapy

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925

QUESTION

A patient with a platelet count of 14,000/mm^3 is interested in practicing an integrative therapy. The nurse suggests trying

A. massage.
B. reiki therapy.
C. acupuncture.
D. yoga.

926

QUESTION

Safety issues with aromatherapy involves

A. lack of standardization of essential oils.
B. triggering of major depressive disorders.
C. allergies to essential oils are well documented.
D. a narrow window of applicability.

927

Oncologic Emergencies

12% Test Content
17 Questions

- Metabolic
- Structural

928

Nursing Interventions

- Identify and assess high risk patients
- Maximize safety
- Monitor for early signs and symptoms
- **Notify MD immediately**

THESE INTERVENTIONS ARE APPROPRIATE FOR ALL ONCOLOGIC EMERGENCIES!!

929

Disseminated Intravascular Coagulation (DIC)

- Complete chaos in coagulation system
  - Simultaneous rapid clotting and bleeding triggered by thrombin
  - Clots consume available platelets and clotting factors
  - Microclots + bleeding = DVT/VTE and hemorrhage
  - Normal coagulation is disrupted, and hemorrhage occurs
- Is an event or state - <u>not a disease</u>
  - Secondary to underlying cause

930

Disseminated Intravascular Coagulation (DIC)

Paradoxical mechanism of hypercoagulation & fibrinolysis

Thrombin

Hypercoagulation ⟷ Fibrinolysis

clot formation & coagulation cascade — clot breakdown

931

Question

L.G. presents with disseminated intravascular coagulation. The nurse anticipates the following lab values

A. increased protein C, decreased BUN, and shistocytes.
B. increased PTT and BUN, and decreased fibrinogen.
C. decreased platelets and increased hemoglobin.
D. increased fibrinogen, decreased BUN, and increased PTT.

934

Risk Factors - Triggers

- **Acute Promyelocytic Leukemia (APL) -** secrete procoagulants
  - 85% of patients with APL exhibit DIC
  - 25% risk of mortality with induction chemotherapy
- Sepsis and severe infection
- Solid tumors - secrete mucin: lung, breast, prostate, colon, pancreatic, ovarian, renal and gall-bladder
- Liver disease
- Graft versus host disease (GVHD)

Other: Trauma, obstetrical complication, severe allergic reactions

932

Laboratory data
DIC Panel

Intravascular Coagulation

- ↓ platelets
- ↓ fibrinogen
- ↓ protein S & protein C
- ↓ Hgb/Hct

Depleted Clotting Factors

- ↑ PT, PTT & INR

Accelerated Fibrinolysis

- ↑ **d-dimer (protein fragments)**
- ↑ **fibrin degradation products – FDP**
- ↓ antithrombin III

Cell Destruction

- Schistocytes (peripheral smear)

- ↑ bilirubin & BUN

935

Question

L.G., diagnosed with acute promyelocytic leukemia (APL), presents with a temperature of 39.6 C, and is suddenly bleeding from old intravenous puncture and bone marrow aspiration sites. She is complaining of shortness of breath and chest discomfort. The nurse knows definitive treatment includes

A. administration of platelets and cryoprecipitate.
B. antibiotic therapy.
C. therapy directed at the leukemia.
D. steroid therapy.

933

Question

The nurse is best to assess the pulmonary status of a patient with disseminated intravascular coagulation by

A. strict intake and output.
B. obtain sputum for cytology.
C. auscultate for wheezes, crackles, and stridor.
D. providing adequate hydration.

936

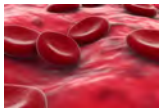
Assessment
Signs & Symptoms

- Petechiae
- Bruising
- Oral/gum bleeding
- Epistaxis
- Hemopytsis
- Hematuria
- Tachycardia
- Dyspnea and hypoxia
- Guaiac positive stools/emesis
- Hemorrhage: sclera, vaginal GI, GU
- Joint pain & stiffness
- headache and altered LOC

937

DIC Treatment

- Treat underlying cause
- Reduce bleeding (massive transfusion protocol)
- Hemodynamic stabilization
- Stop clot formation



938

Medical Management

- Therapies to treat underlying cause
  - Infection - antibiotics
  - Malignancy – chemotherapy
- Hemodynamic stabilize – ventilation, vasopressors
- Transfusions – platelets/PRBC/FFP/cryoprecipitate
- Aminocaproic acid (Amicar) to stop bleeding
- Renal failure - hydration

939

Nursing Interventions

- ICU support for acute DIC (Rescue Alert)
- Monitor vital signs
- "Head to toe" exam
- Assess all puncture wounds, orifices for bleeding
- Gentle mouth care
- Strict bleeding precautions – patient educatio
- Minimize invasive procedures
- Monitor lab studies
- Transfusion management

940

Question

Which of following patients is most at risk of developing a deep venous thrombosis or pulmonary emboli?

A. 67-year-old female with pancreatic cancer receiving a seventh cycle of chemotherapy.
B. 35-year-old female with stage 1 breast cancer about to begin a first cycle of chemotherapy.
C. 20-year-old male with stage 1 Hodgkin disease undergoing radiation to one lymph node area.
D. 69-year-old female breast cancer survivor receiving hormone anastrozole.

941

Venous Thrombus Emboli
Risk Factors

- Active cancer
  - Solid tumors: Lung, GI, Pancreatic, Prostate, and Ovarian
  - Leukemias, multiple myeloma, Hodgkin and Non-Hodkgin Lymphoma
  - Advanced disease or metastatic disease
- Lymphadenopathy
- Venous access device
- Oncology therapy e.g. chemotherapy, hormone therapy (tamoxifen), antiangiogenic agents, erythropoietic –stimulating agents
- Co-mobidities e.g. infection, heart failure, renal disease
- Poor performance status
- Elderly
- Smoking
- Obesity
- Surgery
- Hospitalizations
- Prior history of VTEs
- Lab abnormalities
  - Platelet count > 350,000/mcL
  - WBC >11,000/mcl
  - Hgb <10g/dL
  - Blood transfusions

942

VTE Management

Prophylaxis in high-risk group

- Low-molecular weight heparin
- Unfractionated heparin
- Aspirin
- Anticoagulants:
  - Warfarin
  - Rivaroxaban
  - Apixaban

Treat acute emboli

- Place inferior vena cava filter, if pharmacologic management contraindicated
- Arterial embolectomy
- Thrombolysis
- Monitor PT, PTT, INR

Nursing Care

- Ambulate frequently
- Elevate foot with knee flexed
- Pneumatic compression device
- Physical and occupational therapy
- Patient education
  - Medications
  - Preventive measures
  - Bleeding precautions
  - Dietary restrictions – avoid foods high in vitamin K
  - Smoking cessation

943

SYSTEM	SEPSIS SIRS plus documented infection	SEVERE SEPSIS Sepsis plus one or more: organ dysfunction, hypotension or hypoperfusion	SEPSIS SHOCK Hemodynamic instability despite fluids
CNS	confusion agitation	altered mental status	comma obtund
CVS	sinus tachycardia hypotension responsive to fluids	tachyarrhythmias hypotension hypotension unresponsive to fluids	tachyarrhythmias hypotension unresponsive to fluid resuscitation
Respiratory	tachypnea hypoxia	tachypnea hypoxia crackles wheezes	decreased breath sounds Pulmonary edema Acute respiratory distress syndrome
Renal	decreased output	oliguria or anuria Acute kidney injury Cr >2 mg/dL	oliguria or anuria Acute renal failure
Skin	dry warm	cool or cold decreased perfusion	cold pale decreased perfusion mottling
GI	nausea & vomiting hyperglycemia	decreased motility hypoglycemia	Ileus jaundiced
Lactate level	Normal <2mmol	elevated >4 mmol	Lactic acidosis
Hematologic	neutropenic or leukocytosis	neutropenic or leukocytosis pancytopenia	bone marrow failure

946

Sepsis Continuum

Mortality rate ~30-35%

- **Infection** – Inflammatory response to pathogenic invasion
- **Bacteremia** – Pathogen in bloodstream as evidenced by positive blood cultures
- **Systemic Inflammatory Response Syndrome** – **2 or more of the following:**
  - Oral temp >38°C or <36° C
  - HR >90 /min
  - RR >20 breaths/min
  - WBC >12,000 OR <4,000 OR>10% bands
- **Sepsis** – SIRS plus a documented infection
- **Severe Sepsis** – Sepsis with organ dysfunction (hypotension or hypoperfusion, oliguria, lactic acidosis, AMS)
- **Septic Shock** – Unstable hemodynamics despite aggressive fluid challenge
- **Multi-organ system failure** – One or more organs requiring immediate intervention

944

Diagnostic tests

- **CBC**
- CMP
- Coagulation studies
- **Lactate level (indicator of tissue hypoperfusion if >4 mmol/L)**
- ABG
- **Blood cultures**
- Respiratory viral panel
- Sputum analysis
- Urinalysis or culture
- CT scans
- CXR
- Stool cultures

947

Risk Factors

Host-related

- Age > 65 yrs
- **Prolonged neutropenia**
  - **ANC <500 (life-threatening)**
- Respiratory infection
- Urinary tract infection
- Mucositis
- Malnutrition

Disease-related

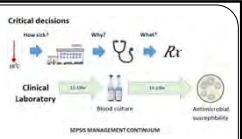
- Concurrent immunosuppressive diseases
  - Leukemia
  - Lymphoma
  - Myeloma
  - AIDS
  - Autoimmune diseases

Treatment-related

- Recent chemotherapy resulting in neutropenia
- Immunosuppressive therapy
  - Steroids
  - Cyclosporine
  - Tacrolimus
  - Sirolimus
  - Mycophenolate mofetil
- Medical devices
  - Central line
  - Urinary catheter
  - Drains
  - Stents
- Hospitalization

945

Sepsis Management



Establish vascular access

- **Empiric antibiotics within 60 min. of recognition**
- Fluid resuscitation for hypotension or lactate >4 mmol/L
  - 1st line crystalloid solution – NS or Ringer's lactate
- Oxygen therapy prn
- ICU support required for severe sepsis and septic shock
  - Vasopressors – 1st line norepinephrine
  - Mechanical ventilation
- Monitor culture reports daily

Supportive therapy

- Blood products
  - RBC transfusions for Hgb <7 g/dL
  - Platelet transfusion for <10,000/mm^3 if stable or 50,000/mm^3 if bleeding
  - FFP for coagulopathy
- Glucose control
- Renal replacement therapy
- Intermittent hemodialysis or ultrafiltration
- DVT prophylaxis
- Nutrition

948

Tumor Lysis Syndrome
TLS

- Metabolic imbalance due to rapid tumor cell kill resulting in electrolyte imbalances

949

Tumor Lysis Syndrome
High Risk Group

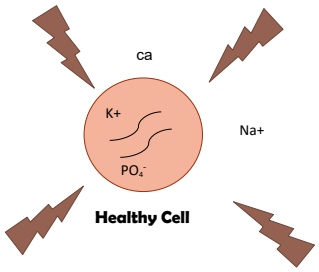
- High-grade lymphoma
  - 40% Burkitt
- Acute leukemia
- Any cancer with large bulky tumor mass

- Pre-existing conditions
  - Chronic renal insufficiency
  - Oliguria
  - Dehydration
  - Hypotension
  - Acidic urine
  - Exposure to nephrotoxin drugs e.g. vancomycin, aminoglycosides, contrast agents for CT scans
  - Splenomegaly
  - Extensive lymphadenopathy
  - Ascites

950

TLS
Treatment-Related

- Chemotherapy
  - Cisplatin
  - Etoposide
  - Cytarabine
- Radiation Therapy
- Immunotherapy
- Biotherapy
  - Rituximab
- Hormone therapy



951

Question

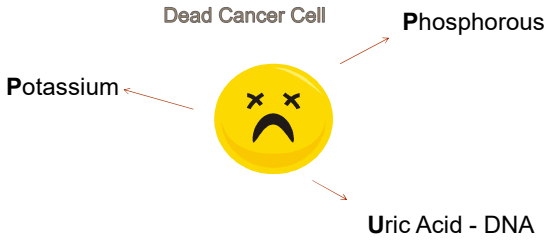
A patient with tumor lysis syndrome will likely exhibit the following lab result

A. potassium 6.5 mEq/L
B. calcium 14.2 mg/dL
C. uric acid 5.0 mg/dL
D. phosphorus 3.6 mg/dL

952

Electrolyte Imbalance

- **"PUP is up!"**



953

Nursing Management

- Administer allopurinol po +/- Rasburicase
- IV fluids
  - start 24-48 hr prior to chemo and 2-3 days post-chemo
- increase diuresis & alkalinize urine (output >100cc/hr)
  - Observe for uric acid crystals
- Monitor for fluid overload (furosemide prn)
- Daily weights
- calcium gluconate supplements
- PhosLo (calcium acetate)
- Dialysis prn
- Monitor metabolic panel q 6-12 hr

954

Question

Which is the most commonly seen oncologic emergency?

A. Syndrome of inappropriate antidiuretic hormone secretion (SIADH)
B. Septic shock
C. Hypercalcemia
D. Disseminated intravascular coagulation

955

Question

Which of the following is considered a contributing factor for the development of hypercalcemia?

A. Male
B. Young age
C. Immobility
D. Fluid overload

958

Hypercalcemia

- Serum calcium > 10.5 mg/dL
- Occurs in 10-20% of oncology patients
- Most common oncologic emergency
- 50% mortality rate
- Skeleton releases more Ca^{+2} into serum than can be reabsorbed or excreted
- Reversible if treated promptly

956

Patients at Risk

- Multiple Myeloma (>50%)
- Breast Cancer (40-50%)
- Lung
- Prostate
- Lymphoma
- Leukemia

Other:

- Renal insufficiency
- Dehydration
- Immobility
- Hormone therapy
- Thiazide diuretics

959

Hypercalcemia Mechanisms

Parathyroid hormone, vitamin D & calcitonin regulate calcium homeostasis

1. Humoral hypercalcemia malignancy (HHM)
   - Patients with little to no bone metastases
   - Parathyroid hormone-related protein [PTHrP] secreted by tumors
   - Results in renal & bone resorption of calcium
2. Local osteolytic hypercalcemia (LOH)
   - Bone provides place for tumor growth
   - Tumor cells produce cytokines leading to calcium resorption
   - Osteoclasts break down bone matrix

957

Hypercalcemia - Signs & Symptoms

- Anorexia
- Nausea and vomiting
- Constipation
- Abdominal pain
- Weakness
  - Muscle fatigue

960

Hypercalcemia - Diagnosis

- Normal serum Ca^{+}: 8.9-10.1 mg/dL
- S&S can be confused with side effects of treatment or related to disease
- Symptoms vary with grading

Severity	Ionized Ca^{+2} mmol/L	Serum Ca^{+2} mg/dL
Mild	1.4 - 2	10.5 – 11.5
Moderate	2 - 2.5	11.5 -13.5
Severe	2.5–3	>13.5

961

Treatment

Treat underlying cause: chemo/targeted therapy/biotherapy/RT

Mild	Moderate	Severe
IVF	IVF	IVF
Antiemetics	Antiemetics	Antiemetics
Limit sedatives	Limit sedatives	Limit sedatives
	Loop diuretics • reduce volume overload	Loop diuretics •reduce volume overload
	Bisphosphonate therapy	Bisphosphonate Therapy
		Calcitonin
		Steroids
		Dialysis

962

Bisphosphonates	Other Medications
Pamidronate disodium • 90 mg over 2-4 hours IV	Denosumab – prevention skeletal events in breast & prostate cancer and myeloma 120 mg SQ every 4 weeks • must correct calcium prior to therapy • must co-administer calcium & Vit D
Zoledronic acid • 4 mg over 15 min. IV	Calcitonin • rapid onset of action • inhibits osteoclasts
	Corticosteroids

963

Preventive Measures

- Recognize population at risk
- Increase oral intake 2-3 L/day
- **Fall risk assessment** ⚠
- Ambulate safely [PT/OT]
- Teach patient & family symptoms to report
  e.g. N&V, anorexia, high urinary output, confusion
- Check serum Ca^{+2} with each visit
- Avoid rough handling/trauma (#)
- Avoid over-sedation (immobility & masks neuro signs)
- Additional therapeutic medications
- Provide emotional support

964

Question

Emergency treatment of syndrome of inappropriate antidiuretic hormone may be required if

A. serum sodium is 135 mEq/L.
B. cardiopulmonary changes are present.
C. serum sodium is 125 mEq/L.
D. significant neurologic changes are present.

965

Syndrome of Inappropriate Antidiuretic Hormone SIADH

- Endocrine paraneoplastic syndrome
- Results from over secretion antidiuretic hormone (ADH)
- ADH release is from posterior pituitary gland or ectopic source leading to hyponatremia

966

SIADH

High Risk:

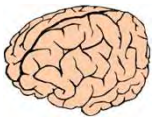
- SCLC & NSCLC accounts for 75% of cases
  - neuroendocrine tumors secrete Antidiuretic Hormone
- Hematology malignancies
- Chemo agent (vinca agents, platinum & alklyating agents)
- Medications – antidepressants, NSAID
- CNS infections
- Guillain-Barre syndrome, vasculitis
- Infections – AIDS, COPD

967

SIADH

Signs & Symptoms

- Neurological
  - Headache
  - Lethargy
  - Disorientation
  - Confusion
  - Seizures & coma (late signs)



- GI
  - Abdominal cramps
  - Nausea & vomiting
  - Diarrhea
  - Anorexia

968

SIADH

Diagnostics & Treatment

Diagnostic Labs

- Increased:
  - Urine osmolality >100 mOsm/kg
  - Urine specific gravity >1.028
  - Urine Na >30 mmol/L
  - Total water volume
- **Decreased Serum**
  - Sodium <130 mEq/L
  - Osmolality <275 mOsm/kg
  - BUN
  - Creatinine
  - Albumin
  - Uric acid

Treatment

- **Demeclocycline** 300-600 mg BID
- 3% hypertonic saline solution
- Loop diuretics (furosemide)
- Tolvaptan, if LFTs not elevated

Nursing Interventions

- **Fluid Restrictions 500 – 1000 ml/day**
- Monitor sodium levels
- Accurate I&O
- Daily weight
- Frequent neuro checks
- Seizure precautions

969

Infusion-related Reactions

- Hypersensitivity – mild to moderate
- Anaphylaxis – severe to life-threatening
  - Symptoms usually occur within first 30 minutes
- Cytokine-release syndrome
  - Symptoms usually occur 30-120 minutes

Drug-naïve patients are responsible for >50% acute reactions & 80% life-threatening anaphylactic reactions

Olsen, M. et al., 2023

970

Question

Anaphylaxis risk increases when medications are given

A. at low doses.
B. intravenously.
C. as a single dose.
D. when synthetically developed.

971

Risk Factors

- Female
- History of allergies/asthma
- History IV contrast rx.
- Prior exposure to drug
- High dose therapy
- Pre-existing cardiac or pulmonary conditions
- IV route
- Untreated patients with hematologic cancer
- Older age (rituximab)
- Younger age (oxaliplatin)
- Type of drug diluents/vehicle
  e.g. cremophor EL – paclitaxel therapy

Olsen et al., 2023

972

Infusion Reactions

REACTION	HYPERSENSITIVITY	CYTOKINE RELEASE
Type	Anaphylactic reaction Type 1	Anaphylactoid Type III
Mechanism	IgE mediated	Non-IgE mediated
Occurrence	First exposure except carboplatin Reaction more severe with each infusion	1st or 2nd infusion only
Time from start of infusion to first symptoms	First 5-30 minutes sudden and profound	30-120 minutes gradual
Agents	paclitaxel docetaxel carboplatin	rituximab cetuximab daratumumab
First line treatment	Epinephrine	Antihistamine Steroid

973

Infusion Reactions
Prevention

Intradermal Skin Testing
Per product insert

Pre-medication
Per product insert or patient history
Allow sufficient time to take effect
Verify outpatient received premeds at home
IV or oral are equally effective

Rapid drug desensitization
multiple diluted incremental infusions
eg. carboplatin or rituximab

Olsen, M. et al., 2023

974

Pre-Treatment Guidelines

Obtain and record baseline vital signs

Review allergy & medical history

Educate patient to report symptoms immediately

Administer all premeds at least 30 prior to infusion
- 60 minutes for oral premeds

Ensure emergency meds are available
- Obtain orders for prn
- Emergency meds prior to treatment
- Standing orders or protocol

Olsen et al., 2023

975

Agent	Overall Incidence	Timing Rx
Docetaxel	15-33% with premeds	1st or 2nd dose
Paclitaxel	41% 2% serious	2-3 min. & 1st – 2nd dose
Etoposide	1-2%	
Bleomycin	≈ 1%	30 – 60 min & 1st – 2nd dose
Liposomal Doxorubicin (Doxil)	up to 45% (7% Product Info)	1st dose (liposome reaction)

976

Agent	Overall Incidence	Timing Rx
Carboplatin	up to 44% 2% serious	7th dose or after 12 month break
Oxaliplatin	5-12%	7th - 8th dose
Cisplatin	up to 20%	4th – 8th dose

977

Hypersensitivity Reactions
Preventive management - Pharmacologic

- Corticosteroids
- Histamine1 (H_1) antagonist e.g. diphenhydramine
- H_2 antagonists e.g. famotidine
- Antipyretics

978

Question

During the administration of paclitaxel, the patient complains of feeling short of breath. The nurse suspects hypersensitivity. What is the first nursing intervention?

A. Call a code
B. Obtain a non-rebreather mask
C. initiate CPR
D. Stop the infusion

979

Hypersensitivity Reactions
Management

- STOP INFUSION
- Maintain IVF – normal saline
- Rescue meds according to symptoms
  - H_1 antagonists
  - H_2 antagonists
  - Corticosteroids
  - Epinephrine
  - Albuterol (inhalation)
- Oxygen prn

980

Anaphylaxis

- **IgE antibody after exposure to an antigen**
  - IgE antibody binds to mast cells & basophils
- Triggers release of inflammatory mediators
  - Histamine
  - Tryptase
  - Leukotrienes
  - Prostaglandins
  - Platelet activating factor
  - Results in systemic vasodilation, increased capillary permeability, bronchospasms & coronary vasoconstriction

981

Anaphylaxis
Management

- Pharmacologic
  - **Epinephrine first-line** ⚠
    - IV or IM given q5 min. to 15 min.
  - H_1 antagonist – decreases itching
  - Corticosteroids – prevents biphasic reaction
- Non-pharmacologic
  - Emergency equipment at bedside
  - **Stop infusion** ⚠
  - Maintain airway - O_2 (100% non-rebreather mask)
  - Frequent vital signs
  - Implement protocol for anaphylaxis
  - IV normal saline
  - Initiate rapid response or code prn

982

Extravasations

- **Tissue damage due to leakage or exposure to vesicants**

Factors that affect the degree of tissue damage:

- Type of vesicant
  - Anthracyclines
  - Taxanes
  - Nitrogen mustard
  - Vinca drugs
- Concentration, amount and location

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983

Peripheral Extravasation Risk Factors

- Small fragile veins
  - Dorsum of hand
- Limited vein selection
- Previous multiple venipunctures
- Probing during IV catheter insertion
- Rigid IV device
- lymphedema
- Sensory deficits
- **Somnolence, impaired cognition, altered mental status** ⚠
- Inadequately secured IV catheter
- Malfunctioning central line
- **Deep Port** ⚠

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984

Central Venous Access Device Extravasations
Signs & Symptoms

- PAIN
- Swelling
- Redness
- Change in quality IV
- No blood return

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985

When You Suspect a Chemo Extravasation…

- **Stop infusion**
- Assess IV site
- **Attach small syringe and aspirate 3-5 mL**
- Notify oncologist
- Apply cold pack or warm pack [vinca alkaloids & oxaliplatin only]
- Administer antidote – if applicable
- Document on Chemo Extravasation Record
  - obtain serial photos

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986

Question

The antidote to treat a suspected doxorubicin extravasation is

A. hyaluronidase
B. dexrazoxane.
C. dimethyl sulfoxide.
D. sodium thiosulfate.

987

Chemo Agent	Antidote	Local Care
Doxorubicin Epirubicin Idarubicin Daunorubicin	Dexrazoxane infusion Days 1, 2, & 3 *Start within 6 hours of extravasation	**Ice – remove 15 min prior to infusion**
Vinca Drugs	Hyaluronidase Injections	Heat
Oxaliplatin	None	**Heat** (cold neuropathy)
Taxanes	None	Ice
Mitoxantrone	None	Ice
Mechlorethamine	Sodium thiosulfate injections	Ice

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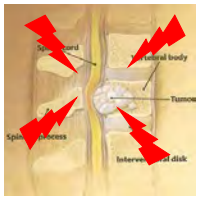
988

12% Test Content
17 Questions

- Metabolic
- Structural

989

Spinal Cord Compression



- Neurological emergency
- Cancer compressing spinal cord OR its blood supply
  - Primary Tumor
  - Metastasis
- Second to brain metastasis for CNS complication

990

Why is this an Emergency?

- Symptoms are usually non-specific
- Neurologic impairment may occur over weeks, days, or HOURS!
- Ambulatory status at diagnosis directly related to prognosis and quality of life
  - Prognosis for ambulatory patients is excellent
  - Less than 10% of paraplegic patients walk again

991

Who Gets SCC?

- 50% - breast, lung, prostate cancer

Other:

- lymphoma
- melanoma
- renal cell cancer
- sarcoma
- multiple myeloma
- Neuroblastoma

- History of vertebral compression fractures

992

Question

The most common presenting symptom of spinal cord compression is

A. motor weakness.
B. sensory loss.
C. neck and back pain.
D. bowel or bladder incontinence.

993

Spinal Cord Compression

- **Early symptoms**
  - **BACK PAIN!!** (96% patients)
  - Sensory loss: light touch, pain or temperature
  - Motor weakness: heaviness or stiffness

994

Early Signs and Symptoms

- **Back or neck pain** (thoracic/lumbar/cervical)
- Pain exacerbated with straining, coughing or flexion of neck
- Motor weakness or dysfunction
- Loss of sensation for light touch, pain or temperature

995

Late Signs and Symptoms

- Loss of sensation for deep pressure and position
- incontinence or retention of urine or stool
- **Paralysis**
- Sexual impotence
- muscle atrophy
- Loss of sweating below lesion

996

Spinal Cord Compression

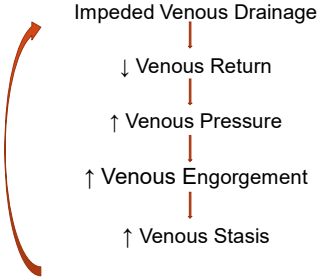
Diagnostics
- **MRI – gold standard**
- CT
- Myelography
- X-rays
- PET scan

Treatment
- **High dose steroids**
  - A/E - Hyperglycemia, mania, insomnia
- Radiation/Chemo
- Surgery
- Analgesics
  - Adjuncts – anticonvulsants antidepressants
- DVT prophylaxis anticoagulants

Nursing Interventions
- **Monitor neurological changes**
- I & O
- **Monitor bowel & bladder function**
- Pressure ulcer prevention
- Mobility Mgmt
  - PT/OT consult
- Education
- Social Work consult
- Psychologist/psychiatrist consult

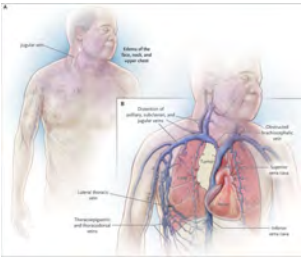
997

SVC Syndrome



1000

Superior Vena Cava Syndrome SVCS



- Compromised drainage of head, neck, upper extremities and thorax through the SVC
- Due to compression or obstruction of vessel by tumor or thrombus

998

Superior Vena Cava Syndrome SVCS

Risk Factors
- NSCLC & SCLC
- NHL
- Breast cancer
- Germ cell tumors
- Thyroid cancer
- GI cancers
- Melanoma
- Kaposi Sarcoma

Other Causes
- Presence of central venous catheter or pacemaker
- RT to mediastinum
- Histoplasmosis, mediastinal fibrosis, fungal infection, benign tumors, and aortic aneurysm

1001

Superior Vena Cava Obstruction SVCS

Superior vena cava
- Located in tight thoracic compartment
- Thin-walled vessel
- Low pressure vessel
- Receives blood from head, neck, thorax and upper limbs

999

Superior Vena Cava Syndrome SVCS – Signs & Symptoms

- Dyspnea/cyanosis
- Facial swelling in a.m.
- Redness & edema
  - conjunctivae
  - Periorbital
- Swelling
  - Upper extremities
  - Head/neck
- Non-productive cough
- Hoarseness
- Vein distention

1002

SVC Syndrome
Late Signs

- **Increased ICP**
  - Headache, blurred vision, dizziness & syncope
- Irritability or altered mental status
- Stridor
- Congestive heart failure
- Tachycardia, tachypnea, orthopnea
- Hypotension – absent peripheral pulses
- Dysphagia, hoarseness, hemoptysis
- Progressive cyanosis

1003

Superior Vena Cava Syndrome
Diagnostics and Management

Diagnostic
- X-Ray/CT/MRI
- ABGs
- CBC
- Coagulation studies

Treatment
- High dose steroids
- Emergency RT
- Chemotherapy
- Diuretics
- Stent placement
- Thrombolytics for thrombus eg. TPA or Heparin
- Oxygen therapy

Nursing Interventions

Symptom Control
- Maintain patent airway
- Fowler or semi-Fowler position
- Monitor dyspnea & hypoxia [ABGs]
- Monitor cardiac output
- I&O
- Avoid venipunctures or compression of arms
- Energy conservation
- Manage anxiety
- Pain control

1004

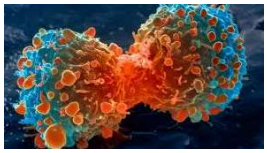
Increased Intracranial Pressure
ICP

- Increase in brain tissue
- Increase vascular tissue
- Increase CSF
- Results in nerve cell damage, permanent neurologic deficits and death

1005

Increased ICP
Risk Group

- Lung
- Breast
- Thyroid
- Melanoma
- Primary CNS Tumors
- Metastatic tumor
- Leptomeningeal metastases
- Posterior reversible encephalopathy syndrome
- Blood clots
- Infection



1006

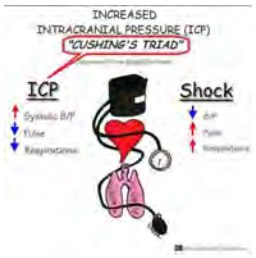
ICP
Early Signs

- Vague
- Headache (AM)
- Dull, sharp or throbbing pain
- Nausea and vomiting, poor appetite
- Blurred vision, pupillary dilation
- Lethargy, apathy, confusion
- Slow speech and word confusion

1007

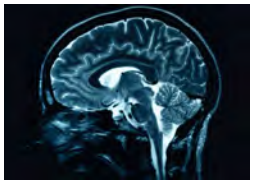
ICP
LATE SIGNS

- **Cushing's Triad (poor prognosis)**
  - Bradycardia
  - Respiratory depression
  - Hypertension
- Widening pulse pressure
- ↓ LOC
- Papilledema
- Cheyne Stokes respirations



1008

ICP Diagnostics



- **MRI (preferred)**
- CT or PET/CT
- ICP monitoring
  - Most reliable method to diagnose ICP
- CT or MRI-guided stereotactic biopsy

1009

Question

Treatment to rapidly lower ICP patient with elevated ICP includes

A. corticosteroids.
B. radiation therapy.
C. emergency surgery.
D. intubation.

1010

Question

Immediate medical treatment for ICP includes

A. calcium channel blockers.
B. anti-seizure agent.
C. diuretic and a corticosteroid.
D. beta blocker.

1011

ICP Treatment

- Emergency surgery
- ICP monitoring
- Shunt placement
- Ommaya reservoir – Intrathecal chemotherapy
- RT – palliative or primary treatment for stable ICP
  - Stereotactic RT - Cyberknife
  - Brachytherapy
- Chemotherapy – procarbazine or nitrosoureas
- Biotherapy – Her2 & BRAF inhibitors
- Corticosteroids
- Osmotherapy
  - mannitol
  - furosemide
- Anticonvulsant therapy
- Hyperventilation by intubation and ventilation
  - Most rapid method
  - Decreases cerebral blood flow
  - Contraindicated in stroke or head trauma

1012

ICP Nursing interventions

- Monitor for mental status changes
- Monitor cardiac output changes
- Fluid restriction
- Seizure precautions
- Osmotherapy
- Reduced activity
- Reduce intra-abdominal & intrathoracic pressures
- Elevate HOB 30°
- Avoid prone position & neck flexion

1013

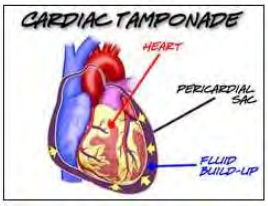
Malignant Effusions

- Can occur in lungs and heart
- True malignant effusions will likely return unless cancer is treated
- High risk patients
  - Lung
  - Breast
  - GI cancers
  - Leukemia
  - Lymphoma
  - Sarcoma
  - Melanoma

1014

Pericardial Malignant Effusions
Cardiac Tamponade

- Excessive fluid in pericardial sac
- Extrinsic pressure on cardiac chambers
- Results in decreased cardiac output and function



1015

Cardiac Tamponade
Pathophysiology

- Pericardium is two-layered sac
  - Parietal
  - Visceral
- Filled with 10-50 mL fluid produced by pericardium
- Fluid allows for heart movement without friction
- Sharp increase in fluid results in cardiac compression of chambers and decrease in left ventricular filling

1016

Cardiac Tamponade
Pathophysiology

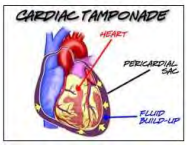
- Increase in pressure from
  - Increased capillary permeability due to chemo or biotherapy
  - Direct trauma
  - Improper central line or pacemaker placement
  - Direct or metastatic tumor invasion – lung, breast, GI tract, leukemia, lymphoma, sarcoma and melanoma
  - Fibrosis of pericardia sac r/t RT
  - Infection
  - Obstruction of mediastinal lymph nodes

1017

Pericardial Malignant Effusions
Cardiac Tamponade

Early Signs/Symptoms

- **Sternal chest pain**
  - Relieved by sitting forward
- Dyspnea with exertions
- **Muffled heart sounds**
- Tachycardia with heart palpitations
- Fatigue
- May be asymptomatic



1018

Pericardial Malignant Effusions
Cardiac Tamponade

Late Signs/Symptoms

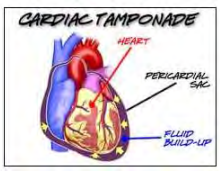
- **Beck's Triad** ⚠
  - Hypotension
    - Narrowing pulse pressure - ↓systolic & ↑ diastolic
  - Distant heart sounds
  - Increased CVP
    - Neck vein distention
- Pulsus Paradoxus [BP drop > 20 mmHg during inspiration]
- Tachycardia
- Tachypnea or orthopnea
- Anxiety
- Altered mental status

1019

Pericardial Malignant Effusions
Cardiac Tamponade

Diagnosis

- **Echocardiogram – most precise**
- CXR
- CT chest
- MRI
- Pericardiocentesis and cytology



1020

Pericardial Malignant Effusions
Cardiac Tamponade

Treatment
- **Large-volume IV fluids**
- Pericardial window
- Pericardiocentesis (exceptions: coagulopathy and thrombocytopenia)
- Pericardial sclerosis
- Chemotherapy for lymphoma, breast cancer or SCLC
- RT for radio-sensitive tumors (exception: Radiation sclerosis)

1021

Cardiac Tamponade
Nursing Interventions

- Frequent cardiovascular assessments
- Oxygen therapy
- Positioning
  - HOB elevated
  - Energy conservation
- Comfort
- Decrease anxiety

1022

Malignant Pleural Effusion
Pathophysiology

- Only 2-10 mL normally in pleural space
- Excessive fluid due to direct tumor to pleura or mediastinum or mesothelioma
- Impaired lymphatic drainage due to tumor obstructing lymphatic flow
- Altered mucosal lung or mediastinal tissue resulting from RT

1023

Malignant Pleural Effusion
Risk Factors

- Lung cancer
- Breast cancer
- Hematopoietic cancers
- Prior pleural effusion
- RT to chest, thorax or abdomen
- Surgery to venous or lymphatic system

1024

Malignant Pleural Effusion

Early Signs/Symptoms
- Asymptomatic
- SOB
- Nonproductive cough
- Pleurtic pain
- Tachypnea
- Decreased breath sounds
- Fever

Diagnostics
- CXR
- chest CT
- US

Treatment
- Chemo
- RT
- Thoracentesis
- Drain placement - PleurX®
- Talc pleurodesis

1025

Pneumonitis

Radiation-induced
- 1-20% of patients receiving RT to thorax
- Subacute inflammation of pleura

Risk Factors
- Total radiation dose & fractionation schedule
- Co-administration of chemotherapy
  - Bleomycin, mitomycin
  - Clorambucil, busulfan
  - Cyclophosphamide & ifosfamide
  - Doxorubicin
  - Vincristine & vinblastine
  - Methotrexate
- Targeted therapies – rituximab, cetuximab, trastuzumab, bevacizumab, alemtuzumab

1026

Pneumonitis
Signs and Symptoms

RT-induced
- Nonproductive cough
- Mild dyspnea
- Low-grade fever
- Pleuritic chest pain
- Occurs 6-12 weeks post-RT
- Symptoms 1-6 months post-RT

Chemo- or Biotherapy-induced
- Develops over weeks or months
- May last years after treatment

1027

Pneumonitis

Diagnostics
- CXR
- Chest CT
- PFT
- ABG

Treatment
- **RT-induced**
  - Cough suppressants
  - Antipyretics
  - Rest
  - Corticosteroids (moderate)
- **Chemotherapy-induced**
  - Monitor PFT
  - Limit cumulative doses
  - Corticosteroids
  - d/c suspected agent
- **Biotherapy-induced**
  - Dose reduction or d/c

1028

Oncologic Emergencies

Obstructions
Bowel & Urinary

1029

Mechanical Bowel Obstruction

Extrinsic
- Adhesions of peritoneum, hernias, volvulus (twisting)

Intrinsic
- Tumors
- Telescoping of intestines (intussusception)
- Ischemia
- Inflammation of bowel

Object
- Foreign body
- Barium impaction

1030

Non-mechanical Bowel Obstruction

- Neuromuscular dysfunction (frozen abdomen)
- Lack of intestinal blood flow
- Illeus
- Pancreatitis
- Artery emboli
- Venous thrombosis
- Metabolic imbalance (hypokalemia)
- sepsis

1031

Risk Factors

Treatment-related
- Manipulation of bowel during surgery
- Surgical trauma to neurogenic pathways
- Previous obstructions
- RT to abdomen

Disease-related
- Bowel tumors (ovarian or colorectal)
- Hernia
- Inflammatory bowel disease
- Peptic ulcers
- Pancreatitis
- Diverticular disease
- Gallstones

1032

Treatment

Surgical
- Resection & reanastomosis
- Decompression with colostomy or ileostomy
- Bypass of lesion
- Lysis of adhesions

Medical
- NPO
- Abdominal decompression
  - NG tube
  - Gastrostomy
  - Rectal tube
  - Intestinal stenting (endoscopic)
- Fluid balance & electrolyte replacement

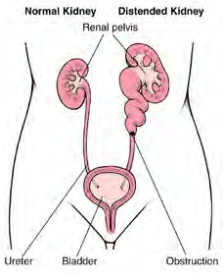
1033

Nursing Management

- Pain Management
  - Analgesics
  - Smooth muscle relaxants
  - Antiemetics
  - Steroids
  - Massage
  - Positioning on side with pillows
- Fluid & electrolyte replacement
- Oral care
- Ambulation
- Deep breathing exercises
- DVT prophylaxis
- Monitor labs
- Monitor vital signs
- Ostomy care
- NG tube care

1034

Urinary Obstruction



- Obstruction of normal flow of urine
- May cause infections that damage the bladder and affect the kidneys
- If the kidneys are injured (*hydronephrosis)* it can be life threatening

1035

Urinary Obstruction
Risk Factors

Treatment-related
- Radiation to renal structure or pelvis
- Hypercalcemia
- Calcium phosphate crystals due to TLS
- Fluid & electrolyte imbalance due to chemo agents
- Nephrotoxic agents (cisplatin, carboplatin, Ifex, high-dose MTX, gemcitabine, antibiotics, antifungals etc.)

Disease-related
- Compression of ureters by metastatic tumor surrounding lymph nodes
- Advanced prostate, ovarian or cervical cancer
- Bladder cancer with muscle invasion

1036

Signs and Symptoms

- Urinary retention
- Weak/interrupted stream
- Hematuria
- Flank/back pain
- Abdominal pain and/or swelling

1037

Labs and Diagnostics

- Kidney, ureter, and bladder (KUB) radiograph
- Renal ultrasonography
- CT scan
- Cystoscopy
- Blood chemistry profile

1038

Management

Conservative Measures

- Analgesic (usually opioid)
- Anticholinergic agent to decrease smooth muscle motility
- indwelling catheter

Invasive Measures

- Suprapubic catheter
- Nephrostomy tube
- Stent placement

- Ileal conduit
  - Stoma constructed from small intestine
- Neobladder
  - Surgically constructed from intestine & attached to ureters

1039

Nursing Interventions

- Restoring optimal urinary function
- Providing a safe environment to prevent injury and infection
- TLS management

1040

Management

Pharmacologic

- hydration with diuretics to maintain balance
- Pain management

Urinary Diversion

- Tube or stoma care
- Skin integrity
- Self-care mgt
- Recurrent infection
- Body image – self image
- Sexual dysfunction

1041

Practice Questions

1042

Question

The single most important risk factor for the development of sepsis is

A. fever.
B. diabetes.
C. inadequate nutritional intake.
D. duration of neutropenia.

1043

Question

A primary medication given to prevent tumor lysis syndrome is

A. mannitol.
B. allopurinol.
C. furosemide.
D. bicarbonate.

1044

Question

Signs and symptoms of anaphylaxis include

A. sudden fatigue.
B. pain at the IV site.
C. angioedema.
D. itching at the IV site.

1045

Question

What percentage of cancer patients experience some level of distress related to their diagnosis or treatment.

A. 35%
B. 50%
C. 75%
D. 100%

1048

Question

A 60-year-old patient with myeloma is admitted to hospital with altered mental status. Lab studies report serum calcium 13mg/dL, potassium 3.0 mEq/L, and phosphorus 6 mg/dL. Which oncologic emergency should the nurse suspect is occurring?

A. TLS
B. DIC
C. SIADH
D. Hypercalcemia

1046

Psychosocial Dimensions of Care Introduction

- 100% of patients, regardless of stage of disease or type, experience some level of distress and existential concern related to:
  - Diagnosis
  - Treatment
  - Survivorship
- Unidentified or untreated distress can increase morbidity, mortality and increase the cost of care
- May affect adherence to plan of care, compromise quality of life and/or lead to suicide

NCCN, Distress Management, v1.2025

1049

Psychosocial Dimensions of Care

12% Test = 17 Questions

1047

Emotional Distress and Cancer

- Unpleasant emotional experience associated with stressors that patients face when living with cancer
- Continuum of emotions ranging from feelings of vulnerability, loss of control, sadness, and fears
- May include psychiatric diagnoses such as clinical depression, adjustment disorder, PTSD, delirium, bipolar, personality disorder, anxiety, and panic disorders

Murphy-Ende, K.. (2024). Psychosocial Disrubances and Coping. In J.M. Brandt, D.G. Cope & M.G. Sarla (Eds.), *Core curriculum for oncology nurses* (7th ed., pp. 518-530). NCCN, Distress Management, v1.2025

1050

1047

"It's a Family Affair"

- **Patient, family and caregiver affected by normative response to illness:**
  - Anxiety
  - Anger
  - Fear
  - Uncertainty
  - Loss of control
  - Sadness
  - Hopelessness
  - Distress
  - Loneliness
  - Grief
- **Mental Health affected by:**
  - Anxiety
  - Depression
  - Body Image
- **Social Health affected by:**
  - Interpersonal Discord
    - Relationships changes
      - Loss of emotional support
      - Loss of partnership
  - Economic Burden
    - Cost of care
    - Loss of employment

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1051

Altered Body Image

- Self-perception is related to actual or perceived change in appearance
  - Alopecia
  - Nutritional alteration
    - Cachexia
    - Obesity with steroids
  - Colostomy or ileostomy
  - Mastectomy
  - Lymphedema
  - Moon face from high-dose steroids
  - Sensory changes
  - Amputation or surgical scar

Murphy-Ende, K.. (2024). Psychosocial Disrubances and Coping. In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses* (7th ed., pp. 518-530). NCCN, Distress Management, v1.2025 1052

1052

Coping Methods

1. **Problem-focused**
   - Address the or eliminating stressor
     - Seeking help from family or friends with transportation
     - Learning to manage symptoms
2. **Emotion-focused**
   - Changing one's emotional reaction
     - Positive – praying, mindfulness meditation, music, counseling (group or individual)
     - Negative – substance use disorder drugs/alcohol
3. **Avoidance-focused**
4. **Adaptive coping and approach-oriented style (resilience)**
   - Positive reframing
   - Active coping
   - Humor

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1053

Distress Management

Periods of Increased Vulnerability

- Suspecting cancer
- Waiting for test results
- Diagnosis
- Treatment-related (awaiting, changing, ending, failure; side effects)
- End of active treatment
- Recurrence
- Progression or metastasis
- Facing death

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1054

Psychosocial Parameters and Oncology

Normal and/or Common Feelings:

- Vulnerability
- Loss of control
- Uncertainty
- Sadness
- Nervousness
- Worry
- Anger
- Fear
- Guilt

Pirl, W.F. in Eggert, Byar & Parks, 2022 1055

1055

Psychosocial Parameters and Oncology

Disabling Feelings

- Clinical Depression
- Anxiety
- Panic
- Extreme Anger
- Existential & spiritual crisis
- Hopelessness

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1056

Disabling Responses

- Long-standing sleep disorder
- Eating disorders
- Sexual dysfunction
- Loss of faith
- Social withdrawal from family & friends
- Despair
- Anhedonia (loss of pleasure)
- Rejection of help
- Abuse or neglect
- Preoccupation with loss and death
- **Suicidal ideation**

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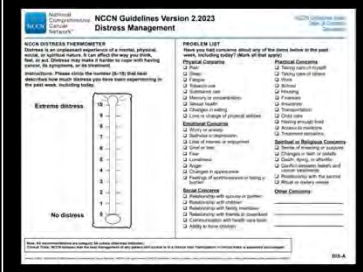
1057

Distress Management
NCCN Guidelines

- Incorporate the screening of distress into the standard care of oncology patients e.g. NCCN Distress Thermometer Scale 0-10
  - **Score of ≥4 should trigger further evaluation & referral**
- Tailor standards to resources
- Provide patients identified with distress with resources and/or referral
- Follow-up and re-evaluate patients for psychosocial needs



NCCN, Distress Management, v2.2023 1060

1060

Common Psychosocial Consequences

- Impaired sleep
- Loss of appetite
- Mental distraction
- Difficulty concentrating
- Impaired body image
- Temporary loss of interest in usual activities
- Loss of sexual relations
- Questioning & asking "Why?"
- Limiting social contact
- Family discord

Pirl, W.F, in Eggert, Byar & Parks, 2022

1058

Distress Management

- All patients should be screened for distress at:
  - ***initial visit***
  - ***appropriate intervals and as clinically indicated***
    - changes in disease status
      - remission, progression and recurrence
      - treatment-related complications
- All practices should provide quality distress management programs/services and quality improvement projects

Free Service

- American Cancer Society www.cancer.org
- American Institute for Cancer Research www.aicr.org
- American Psychosocial Oncology Society http://apos-society.org/
- Cancer Support community http://www.cancersupportcommunity.org
- CancerCare www.cancercare.org
- National Cancer Institute www.cancer.gov
- Cancer.net www.cancer.net

CoC, 2020; NCCN Distress Management, v1.2025 1061

1061

Question

What score on the NCCN distress thermometer indicates further action by the healthcare provider is required?

A. 80
B. 15
C. 7
D. 2

1059

1059

Emotional Distress
Risk Factors

- Presence of discomforting thoughts
- Social and cultural attitudes
  - Dealing with illness, cancer diagnosis, and openness
- Available support
- Diagnosis or symptoms
  - **Lung, pancreatic, head & neck, advanced cancer and poor pain control**
- Age and gender-specific: less than age 45 and female
- Role changes across cancer trajectory
  - e.g. father, mother or partner
- Personality and coping style

Murphy-Ende, K.. (2024). Psychosocial Disrubances and Coping. In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses* (7th ed., pp. 518-530). NCCN, Distress Management, v1.2025 1062

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Question

Which of the following interventions influences a patient's ability to adjust and adapt to a cancer diagnosis?

A. Positive reframing and anticipatory guidance.
B. Family structure and dynamics.
C. Educating the family about the disease and treatment.
D. Mobilizing the patient's support system.

1063

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Distress Management Interventions

- Screen for ED using an evidence-based tool
- Acknowledge distress
- Discuss concerns – personal meaning of illness
- Allow ventilation of feelings
- Explore past coping strategies
- Referral to licensed mental health professionals
- Spiritual counseling
- Support groups
- Exercise, relaxation, dance, yoga, art, dance, music etc.
- Family and couples therapy

Image: Unknown Author

NCCN Distress Management, v1.2025

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Cultural and Attitudinal Barriers to Psychosocial Care

- Family differences in dealing with illness
- Withholding diagnosis from family member
  - Stigma
  - Fear
  - Vulnerability i.e., can't cope with diagnosis
- Prejudice and stigma of emotional breakdown associated with weakness

Pirl, W.F, in Eggert, Byar & Parks, 2022

1065

1065

Practical Problems Associated with Cancer Care

- Literacy level or language barriers
- Comorbidities that impair
  - Food preparation
  - Medication-taking
  - Treatment adherence
  - ADL
- Access to transportation
- Lack of medical insurance
  - Underinsurance
- Job-related difficulties
  - Work increase
  - Decrease or changes
- School-related difficulty
- Financial difficulties
  - Financial toxicity

Pirl, W.F, in Eggert, Byar & Parks, 2022

1066

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Role of Nurse

- **Risk assessment (SDOH)**
  - Family issues
  - Financial management
  - Living conditions
  - Substance use disorder
    - Alcohol
    - Illicit drugs
- **Discuss possible resources**
  - Referral to clinic/hospital social worker, mental health professionals or financial advisor
  - Access to national & local community resources

Pirl, W.F, in Eggert, Byar & Parks, 2022

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Financial Resources
National Services Organizations

- The Cancer Financial Assistance Coalition www.cancerfac.org
  - Searchable database of financial resources
- CancerCare financial assistance programs www.cancercare.org/financial
  - Transportation, childcare & oncology social workers
- The Health Well Foundation www.healthwellfoundation.org
  - Medication cost assistance for patients with chronic disease
- Blood Cancer United www.LLS.org/support/financial-support
  - Patient financial aid program
  - Co-pay Assistance, travel assistance & more
- The National Foundation for Transplants www.transplants.org
  - Fundraising assistance for patients needing a transplant

1068

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Financial Resources
Local Services Organizations

- Financial assistance, grants or specific services or products (travel or medication)
  - Catholic Charities and Jewish Social Services
  - The Lions Club
  - Lutheran Social Services
  - Salvation Arm
  - American Cancer Society
    - Hope Lodge
    - Ronald McDonald House Charities
    - Joe's House
  - Local churches, synagogues and mosques
  - Cancer advocacy groups and Travel Assistance organizations

1069

1069

Psychosocial Distress

Anxiety:
- State of feeling uneasy & apprehensive in response to a vague, non-specific or unidentifiable threat
- "Scan-xiety" – awaiting results or annual f/u scans

Signs and symptoms
- Agitation or restlessness
- Sleep disturbance
- SOB
- Palpitations
- Lightheadedness
- Weight loss or gain
- Mood changes

Pirl, W.f. in Eggert, Byar & Parks, 2022

1070

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Question

Which of the following is an evidence-based screening tool specific to anxiety?

A. NCCN distress thermometer
B. General Health Questionnaire (GHQ)
C. Patient Health Questionnaire 9 (PHQ-9)
D. GAD-7

1071

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Anxiety
Risk Factors

- 44% incidence
  - 23% suffer significant level (Schag and Einrich, 1989; Stark et al., 2002)
  - Frequently occurs with depression
- Disease
  - **Trajectory points** – new diagnosis, initiation of treatment, completion of treatment, recurrent disease, advanced stage and end of life
  - Uncertainty – prognosis
  - Inadequate symptom control

- Abnormal metabolic state
  - Hyperthyroidism
  - Hormone-secreting tumors
  - Paraneoplastic syndromes
  - Electrolyte imbalance
  - Hypoxia
  - Sepsis
  - Delirium
  - Hypoglycemia

Pirl, W.F. in Eggert et al., 2022

1072

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Anxiety
Risk Factors

- **Treatment-related**
  - Prolonged hospitalization, BMT, major surgery
  - Failure/relapse/termination
  - Palliative chemo, RT, or phase 1 or 2 clinical trial
- **Medications**
  - Steroids
  - Opioids
  - antihistamines
- **Lifestyle-related**
  - Exposure to new situations
  - Alcohol or drug withdrawal

- **Body Image Change**
  - Mastectomy, colostomy, orchiectomy, alopecia, skin changes, amputation, weight loss or gain
- **Psychiatric Disorders**
  - Depression
  - Delirium
  - Paranoia, persecution or delusions
- Pre-existing anxiety disorders
- Genetics
- Age & gender: <age 50 and female

Pirl, W.F in Eggert, 2022

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Anxiety
Risk Factors

Interpersonal-related
- Future health, relationships, financial, social or occupational roles and responsibilities
- Loss of independence and perceived loss of control
- Limited coping skills
- Cumulative losses leading to social isolation
- Limited social resources

Murphy-Ende, K.. (2024). Psychosocial Disrubances and Coping. In J.M. Brandt, D.G. Cope & M.G. Sarla (Eds.), *Core curriculum for oncology nurses* (7th ed., pp. 518-530). NCCN, Distress Management, v1.2025

1074

1074

Anxiety
EBP Interventions

- Treat underlying cause, when possible
- Treat symptoms e.g. pain, dyspnea, insomnia etc.

ONS EBP: Recommended
- Cognitive behavioral Interventions or Approach
  - Learning to turn negative thoughts or behaviors into positive problem-solving
  - Mindfulness-based stress reduction
  - Music/Music Therapy
  - Psychoeducational interventions
    - Treatment, symptoms and resources
  - Yoga

ONS, Clinical Interventions: Anxiety, 2019

1075

Question

Which of the following patients have the highest suicide rates among all cancer survivors?

A. Breast, lung, esophageal and pancreatic.
B. Colon, melanoma, CNS and cervical.
C. Leukemia, lung, colon and ovarian.
D. Prostate, head and neck, pancreatic and lung.

1078

EBP: Anxiety-Interventions
Likely to be Effective

- Anxiolytics
- Coaching
  - Verbal and written
  - Checklist and telephone conversation
- Massage/Aromatherapy Massage
- Meditation
- Progressive muscle relaxation (PMR)
- PMR and Guided Imagery
- Spiritual interventions

EBP, ONS, 2019ONS, Clinical Interventions: Anxiety, 2019

1076

Depression
Risk Factors

- 5-20% of patients at some point in their treatment
- 40% in certain populations

Almost 90% of psychological disorders were reactions to the disease or treatment
- 1st year of treatment
- Active advanced disease
- **Breast (highest), pancreatic, prostate, lung, CNS, and head & neck cancer**
- Young adults
- Poorly controlled pain, nausea or dyspnea
- Mental health history or physical limitations
- Disease recurrence and/or prolonged treatment course
- Medications: chemo-immunotherapy, biotherapy, hormone therapy, steroids, opioids, benzodiazepines

Pirl, W.F., in Eggert, Byar & Parks, 2022

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Psychosocial Disturbances & Alterations

Depression

1077

Depression
Assessment

Defining Symptoms
- Depressed mood
  - acute < 6 months
  - chronic ≥6 months
- Loss of interest and pleasure in activities
- history of major depression or suicide attempt
- Insomnia, early awakening or oversleeping
- Fatigue
- Psychomotor agitation
- feelings of worthlessness
- Recurrent thoughts of death
- **Suicidal ideation**

1080

Question

Which of the following is an evidence-based screening tool specific to depression?

A. National Comprehensive Cancer Center distress thermometer
B. General Health Questionnaire (GHQ)
C. Patient Health Questionnaire 9 (PHQ-9)
D. Zarit Burden Interview

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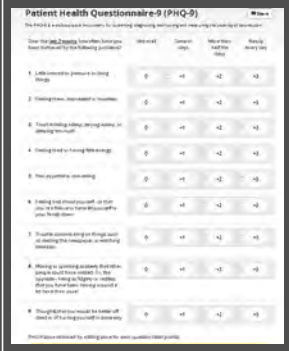

https://www.hiv.uw.edu/page/mental-health-screening/phq-9

1082

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EBP: Depression-Interventions
Recommended for Practice

- Referral if suicidal thoughts or desire to hasten death
- Antidepressant medication
  - **duloxetine**
  - fluoxetine
  - mirtazapine
  - fluvoxamine
  - escitalopram
  - paroxetine
  - sertaline
- Cognitive-behavioral interventions or approach
  - Help patients identify negative or unhelpful thoughts, beliefs, behaviors and establish goals to change them
- Integrated behavioral health care model
- Mindfulness-based stress reduction
- Psychoeducational interventions
- Yoga

Pirl, W.F., in Eggert, Byar & Parks, 2022; ONS, Clinical Interventions: Depression, 2019

1083

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EBP: Depression - Interventions
Likely to be Effective

- Computerized Cognitive Rehabilitation
- **Exercise**
- Group Psychotherapy
- Individual Psychotherapy
- Meditation
- Peer counseling
- Progressive muscle relaxation (PMR)
- Relaxation therapy

Pirl, W.F., in Eggert, Byar & Parks, 2022; ONS, Clinical Interventions: Depression, 2019

1084

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Loss of Personal Control

- Loss of ability to cope with current or future events
- Powerlessness has negative effect on well-being

Risk Factors

- Unexpected diagnosis and lack of knowledge regarding disease and treatment
- Uncertainty of prognosis
- Physical disability or cognitive impairment
- Frequent hospitalizations or ICU stay
- Terminal phase of illness
- Lengthy treatment or treatment failure
- Developmental, personality and culture-related

Murphy-Ende cited in Brant et al., 2020

1085

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Loss of Personal Control
Interventions

- Encourage questions and explain ongoing process
- Assist in decision making by reinforcing treatment options, risks and benefits
- Offer counseling
- Encourage verbalization of feelings
- Provide emotional support

Murphy-Ende cited in Brant et al., 2020

1086

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Cancer Impact
Post-traumatic Growth

"Cancer changed my life and how I feel about myself in ways I never expected.

It helped me to talk about those changes."

- Finding a "new normal"

1087

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Question

Which of the chemotherapy classifications is associated with fertility dysfunction?

A. Anthracyclines
B. Vinca alkaloids
C. Alkylating agents
D. Taxanes

1088

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Question

Which of the following patients is at highest risk of infertility due to chemotherapy toxicity?

A. 8-year-old Eva
B. 20-year-old John
C. 16-year-old Kristen
D. 30-year-old Elaine

1089

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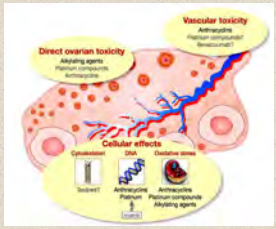
Fertility Statistics

- 18 million cancer survivors in 2020
  - 30 million expected by 2030 (ACS, 2022)
- 4% of survivors are less than age 39
  - Breast cancer
  - Melanoma
  - Cervical cancer
  - NHL
  - Leukemia
- **Alkylating and alkylating-like agents, RT and surgery are top causes of dysfunction**
- Women older than age 30 are most affected by infertility due to fewer oocytes



https://rep.bioscientifica.com/view/journals/rep/144/2/153.xml

1090

Female Infertility

- **Depletion or damage of ovarian follicles**
  - Decreased ovarian volume
  - Premature ovarian failure
  - Menses does not equal fertility
- **RT treatment-induced uterine damage** (GU/Gyne cancers and sarcoma)
  - Vaginal stenosis and webbing
- **Pituitary dysfunction**
  - Hypothalamic-pituitary-gonadal axis damage due to surgery or RT

Nishimoto, P.W. & Kim H.J. in Eggert, Byar & Parks, 2022

1091

Male Infertility

♂

- Bladder cancer, testicular cancer and prostate cancer are high risk
- Impaired sperm production
  - Recovery 1-3 years
- Impaired sperm transport
  - Inability to close bladder during ejaculation
  - Retrograde flow of sperm into bladder
- Pituitary gland dysfunction
  - Related to brain external RT or surgery
- Primary or secondary hormonal changes
- Damage to germinal stem cells in the testes

Nishimoto, P.W. & Kim H.J. in Eggert, Byar & Parks, 2022

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Female
Fertility Preservation

Toxicity Reduction

- **Ovarian Transposition**
  - Prior to external RT
  - Does not protect uterus
  - Requires fertility treatment
- **Ovarian Suppression**
  - Gonadotropin-releasing hormone (GnRH) suppression
    - Leuprolide acetate
    - Research mainly in breast cancer
- **Alternative treatment**
  - To limit gonadotoxic effects

1093

Reproductive Alterations
Preservation Management

- **Female**
  - Referral to Reproductive Endocrinologist prior to treatment
  - Gonadal shielding
  - Cryopreservation of embryos or oocyte
  - Ovarian tissue cryopreservation
- **Male**
  - Sperm banking
  - Gonadal shielding during XRT
  - Other
    - Testicular sperm extraction
    - Electro sperm extraction
    - In vitro fertilization
    - Spermatogonial stem cell therapy
    - Testicular tissue implantation (experimental)

wwwLivestrongFertility.org

1094

Family Planning

- Natural Conception
  - Wait 1-2 years
  - Consult reproductive specialists regarding ability to carry a child
- In vitro fertilization (IVF) therapy
- Surrogacy
- Adoption
  - Typically requires documentation of cancer status
- Child-free living

1095

Fertility Resources

- American Society for Reproductive Medicine www.asrm.org
- American Society of Clinical Oncology www.cancer.net
- Livestrong Fertility www.livestrong.org/we-can-help/livestrong-fertility
- RESOLVE: The National Infertility Association www.resolve.org
- Save My Fertility www.savemyfertility.org

1096

1096

Question

A patient is prescribed hormonal therapy for cancer. What sexual functioning concern should be discussed with the patient?

A. Hormone therapy has fewer sexuality-related concerns than chemotherapy.
B. The effects are reversible once treatment has been completed.
C. Hormone therapy can have multiple short- and long-term effects in both women and men.
D. The therapy will cause significant fatigue.

1097

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Question

Prior to attempting to naturally conceive after treatment, cancer survivors should wait at least

A. 3-6 months.
B. 5 years.
C. 3 years.
D. 12 months.

1098

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Post-Treatment Fertility

- Fertility preservation is not 100%
- Length of time for gamete repair is 6-12 months
- Evaluation of options should be reviewed 12 months after treatment completion for physical and psychological recovery
- Males usually recover sperm production years later
- Females may be initially fertile but lose fertility sooner
  - Most reliable method to assess ovarian reserve is serum anti-Mullerian hormone (AMH) level in females over 25 years of age or older
  - Menses may continue 10-15 years after onset of infertility

1099

Question

Evidence-based models that enhance sexual health communication include

A. GoodTherapy, Timing, Response.
B. Plissit, 5 A's, and Better.
C. Attitude, Better, and Response.
D. Mindfulness-based Therapy, 5 A's, and React.

1102

Sexuality
Introduction

- 40-100% cancer survivors experience treatment and cancer-related sexual problems (Sadovsky et al., 2010)
- If healthcare providers intervene, 70% of patients with cancer will have sexual function return to normal
- Without interventions, sexual performance decreases over time (Cleary, et al., 2013)

1100

Sexuality Assessment
BETTER Model

- B – Bringing up the topic
- E – Explain that sexuality is a part of quality of life and they can talk about any concerns
- T – Tell the patient about resources
- T – Time the discussion to the patients' preferences
- E – Educate about the sexual side effects of treatment
- R – Record assessments and interventions

Nishimoto, P.W. & Kim H.J. in Eggert, Byar & Parks, 2022

1103

Sexuality – Risk Factors

- Gender
  - Women >30 yrs old
    - GYNE surgery
    - Breast cancer
  - Men
    - Any age beyond puberty
    - Testicular/Prostate surgery
- Tumor site
  - GU or GI
- Treatment
  - Chemotherapy
  - Hormone/endocrine therapy
  - RT – pelvis
  - HSCT/BMT
- Surgery
  - Prostatectomy
  - Orchiectomy
  - Cystectomy
  - Head and neck
- Stress
  - Emotional distress
- Body Image changes
  - Alopecia
  - Ostomies
  - Head and neck surgery
  - Mastectomy
- Reproductive and Fertility Issues

Nishimoto, P.W. & Kim H.J. in Eggert, Byar & Parks, 2022

1101

Sexuality Intervention
PLISSIT Model

- P – Permission to discuss topic
- LI – Limited information
- SS – Specific suggestions
- IT – Intensive therapy referral

Nishimoto, P.W. & Kim H.J. in Eggert, Byar & Parks, 2022

1104

Sexuality Intervention
5 A's Model

- Ask – Bring up the topic
- Advise – Normalize symptoms and acknowledge problems
- Assess – Ask about sexual functioning and use standardized assessment
- Assist – Provide information and resources
- Arrange – Follow up or referral

Nishimoto, P.W. & Kim H.J. in Eggert, Byar & Parks, 2022 1105

1105

Question

An essential component of sexual assessment of cancer patients who identifies as lesbian, gay, bisexual, and transgender is to

A. Refer to a clinical psychologist.
B. Use the ASK framework.
C. Use the 5A's model.
D. Focus on symptoms and interventions.

1106

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LGBT Assessment and Intervention
ASK Framework

- Ask – Ask about impact of cancer on sexuality
- Sensitivity – Sensitivity to needs and concerns
- Knowledge – Provide information and resources

Griggs J., et al., (2017). American Society of Clinical Oncology Position Statement: *Strategies for Reducing Cancer Health Disparities Among Sexual and Gender Minority Populations.* JCO, 35, 19. p. 2203-2209.

1107

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Cancer and Sexual Gender Minority

- LGBT with cancer face many barriers to health care
  - suboptimal access to cancer screening and access to cancer care
  - lack healthcare insurance
  - face outright discrimination
- Coordinate efforts to enhance patient and caregiver education, to improve outreach and support
- Train and educate all health care workers to be knowledgeable about and sensitive to the needs of the community
- Encourage constructive policy and legislative action
- More research to guide quality care

Griggs, et al., 2017 1108

1108

Sexuality Resources

- American Cancer Society www.cancer.org
- Will2Love https://www.will2love.com
- Planned Parenthood https://www.plannedparenthood.org
- Oncolink www.oncolink.org/oncolife
- Mautner Project www.mautnerproject.org (same-sex partners for women)
- Sloan-Kettering Sexual Health Program www.mskcc.org/mskcc/html/13814.cfm
- **LGBT Community** http://cancer-network.org
- **National LGBT Cancer Project** https://www.lgbtcancer.org/
- **ASCO Position Paper Reducing Cancer Health Disparities Among Sexual Gender Minority** http://ascopubs.org/doi/pdf/10.1200/JCO.2016.72.0441
- American Association of Sexuality Educators, Counselors and Therapists www.aasect.org
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Cultural, Spiritual & Religious Diversity

Eggert, 2022

1110

Question

Which concept is most difficult to define?

A. Culture
B. Religion
C. Spirituality
D. Diversity

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Spirituality and Religiosity Cancer Adjustment

- Ability of patient and family to cope with initial diagnosis and make decisions regarding cancer treatment independent of other cultural factors
- **Some experience a positive impact and response to cancer and its treatment**
  - Heightened sense of spirituality
  - View cancer as "God's will"
  - Use faith as a coping mechanism
- **Others may experience spiritual distress**
  - Sense of abandonment by a greater power
  - Inability to find meaning in their diagnosis
  - Feel punished, justly or unjustly

Houzous, E. A. Cultural and Spiritual Care. In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses* (7th ed.), pp. 513-517.

1114

1114

Religion

- **An organized system of worship**
- Follow regulated practices intended to embrace spirituality
- Religiosity and spirituality are core discussions

Houzous, E. A. Cultural and Spiritual Care. In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses* (7th ed.), pp. 513-517.

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Question

Which of the following psychosocial approaches specifically focuses on finding meaning and purpose in life within the cancer journey?

A. Cognitive behavioral therapy
B. Supportive psychotherapy
C. Existential psychotherapy
D. Dignity therapy

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Spirituality

- How a person perceives their place in the world
- Determines how a person relates to and interacts with other people, animals, nature and the world around them
- **All persons are spiritual**

Houzous, E. A. Cultural and Spiritual Care. In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses* (7th ed.), pp. 513-517.

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Spirituality Religiosity & Hopefulness *Interventions*

- **Respect patient's spiritual and religious beliefs**
  - Create time, space and privacy for rituals
  - When appropriate, pray with patient and caregivers
  - Encourage patient and caregiver to speak with spiritual/religious leader
- **Support patient's use of coping mechanisms**
  - Refer to hospital chaplain or support group
- **Existential psychotherapy**
  - Finding a sense of meaning in an advanced illness
- **Assist with exploring integrative modalities of coping**
  e.g. Meditation, yoga, prayer, expressive therapies such as art therapy, music therapy, and journaling

Houzous, E. A. Cultural and Spiritual Care. In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses* (7th ed.), pp. 513-517.

1116

1116

Question

The initial step to developing a program to address cultural sensitivity within an organization is

A. developing family-focused interventions.
B. assessing one's own cultural beliefs and values.
C. emphasizing that good health is best defined within a cultural heritage.
D. conducting focus groups with diverse communities.

1117

1117

Framework of Cultural Orientation Culture and Cancer

- Patient-centered approach
- Understand patient's cultural boundaries
- Investigate main issues for patients with regards to cancer and illness
- Developing trusting relationship is key
- Unconditionally accept patients
- Recognize and respect cultural differences

Houzous, E. A. Cultural and Spiritual Care. In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses* (7th ed.), pp. 513-517.

1120

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Culture

- Values, beliefs, norms and practices of a particular group that are learned and shared
- Guides thinking, decisions & actions in a patterned way
- EBP interventions core of culturally-sensitive care

Houzous, E. A. Cultural and Spiritual Care. In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses* (7th ed.), pp. 513-517.

1118

1118

Culture and Cancer

- Meaning of a life-threatening diagnosis is largely influenced by culture
  - Response may range from stoic acceptance to highly demonstrative
  - Often considered devastating news
- Cancer prevention behaviors
  - Distrust US medical system
  - May rely on unlicensed healers
  - May lack knowledge as new immigrants
  - Fatalistic view of cancer

Houzous, E. A. Cultural and Spiritual Care. In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses* (7th ed.), pp. 513-517.

1121

1121

Demographics – United States Cultural Diversity

- 1950's – 9/10 Americans were of European descent
- 2017 – Hispanics account for 18.1% US population (US Census, 2017)
  - Cuban
  - Mexican
  - Puerto Rican
  - South or Central American
  - Identify as Spanish in culture
- 5.8% US population are Asian
- US Census predicts by 2044
  - Majority will be a race other than non-Hispanic white

Houzous, E. A. Cultural and Spiritual Care. In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses* (7th ed.), pp. 513-517.

1119

1119

Responses to Cancer Experience

- Cultural norms influence all aspects of cancer
  - Screening & prevention
  - Seeking diagnosis
  - Treatment options
  - Symptom management
  - Response to advanced cancer
  - Palliative care
  - End-of-life care

Houzous, E. A. Cultural and Spiritual Care. In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses* (7th ed.), pp. 513-517.

1122

1122

Question

What role does poverty as a culture play in healthcare?

A. With the same treatment, poverty has little impact on outcome.
B. Poverty crosses racial and ethnic groups and has an impact on health status.
C. Its influence on access to healthcare can be remedied with free screenings.
D. Poverty increases a person's willingness to accept sliding scale services offered.

1123

1123

Issues in Cultural Care SDOH

- Financial burden of cancer care
- Access to care
- Lack method to define healthcare cultural competence
- Minorities not represented in clinical trials and lack access to pharmaceutical agents
- Social justice
  - advocacy in protecting patients' rights
- Health literacy levels
  - Patient education materials should be 6th grade reading level
  - Most cancer educational materials are at 8th grade reading level

Hirschey, R. Social Determinants of Health and Financial Toxicity (2024). In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses* (7th ed.), pp. 507-512.

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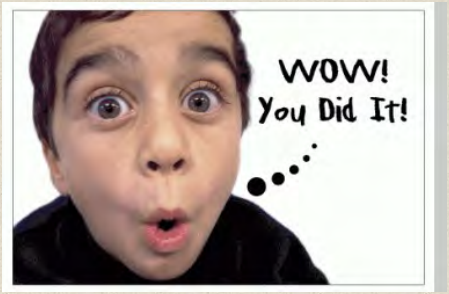

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EBP Approach

- Quasi-experimental (lack randomization) or qualitative studies most helpful
- Delivery of transcultural nursing care
- Rejection of bias and ridicule related to race, religion or sex

Be knowledgeable regarding groups of people affected by cancer

- Develop therapeutic relationship
  - Be less judgmental & more open
  - Address each patient in formal context
  - Being mindful of kindness
  - Professionally introduce oneself
  - Use trained translators

Hirschey, R. Social Determinants of Health and Financial Toxicity (2024). In J.M. Brandt, D.G. Cope & M.G. Saria (Eds.), *Core curriculum for oncology nurses* (7th ed.), pp. 507-512.

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Evaluation

- Do you know where your learning gaps are?
  - Do you have a study plan?
  - Do you feel prepared to challenge the test?
- Complete the evaluation to receive your CNE certificate
- ***Thank You*** for your participation and commitment to oncology nursing practice!

- **Join FLASCO today!**

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