HELPFUL HINT
A pharmacology textbook will provide a more extensive discussion of chemotherapy.

MATCHING KEY TERMS
Match the term with the correct definition.

1. ______ benign cells
   a. Immature lymphocytes
2. ______ blast cells
   b. Plan of research-based care outlining drug therapy and follow-up interventions
3. ______ clean margins
   c. Within the spinal column
4. ______ extramedullary
   d. Decrease in number of white blood cells (WBCs) that results in reduced ability to fight infection
5. ______ immunosuppression
   e. Reduction in platelet count
6. ______ intrathecal
   f. Slow-growing cells forming a tumor with distinct borders
7. ______ malignant cells
   g. Outside the bone marrow
8. ______ neutropenia
   h. Evidence of normal, disease-free tissue in the outermost layer of cells of a surgical sample
9. ______ protocol
   i. Abnormal cells that have invasive and unregulated growth
10. ______ thrombocytopenia
    j. Weakening of the body’s normal immune response

REVIEW OF CANCER
1. Any tumor that arises from new, abnormal growth is called a _____________________________.
2. The two ways that cancer cells spread are _____________________________ and _____________________________.

3. Why is staging done for tumors?

Answer as either true (T) or false (F).

4. ______ The cause of most childhood cancers is unknown.
5. ______ Screening tests for cancer in childhood are the same as adult cancer screening tests.
6. ______ Cancer in children is a common occurrence.
7. ______ Symptoms of cancer in children resemble those of common childhood illnesses.
8. How is a child positioned for a bone marrow aspiration?

THE CHILD WITH CANCER

1. Identify the three primary treatment modalities for children with cancer.
   a. 
   b. 
   c. 

2. Chemotherapy is the use of ___________________________ to kill cancer cells.
   
3. Identify the three body systems whose cells are most often affected by chemotherapy.
   a. 
   b. 
   c. 

4. Define _nadir_.

5. ___________________________ places the child with cancer at risk for the development of opportunistic infections.
   
Identify each of the following signs and symptoms as a side effect of chemotherapy (C), radiation (R), or both (B).
   6. _____ Skin reactions
   7. _____ Nausea and vomiting
   8. _____ Alopecia
   9. _____ Bone marrow suppression
   10. _____ Stomatitis
   11. _____ Fatigue
12. Which class of antiemetic drugs has been found to be more effective than other antiemetics in treating chemotherapy-induced nausea and vomiting?

13. What is the purpose of a biopsy?

14. How would a central venous catheter facilitate chemotherapy administration?

15. The side effects of radiation therapy are specific to the _________________ and _________________.

16. The side effects of radiation therapy usually appear ________________ days after treatment is initiated.

17. ________________ is the most common side effect of radiation therapy.

18. What is the difference between hematopoietic stem cell transplantation (HSCT) and bone marrow transplantation (BMT)?

19. Hematopoietic stem cells are able to differentiate into _________________.

Match each term with its description.

20. ______ autologous transplant  
21. ______ allogenic transplant  
22. ______ umbilical cord blood  
23. ______ graft-versus-host disease (GVHD)  
24. ______ engraftment  
25. ______ conditioning  
26. ______ colony-stimulating factors (CSFs)  
27. ______ peripheral blood stem cells (PBSCs)  

a. Occurs when transplanted bone marrow recognizes the recipient’s tissue as foreign  
b. Occurs when the transplanted cells produce WBCs, red blood cells (RBCs), and platelets  
c. Goal is to eradicate any disease from the body with high-dose chemotherapy and radiation therapy  
d. Source of stem cells for transplantation  
e. Source of stem cells for autologous transplants  
f. Transplanted cells come from a related or unrelated donor  
g. Naturally occurring biologic agents that stimulate the recovery of WBCs, RBCs, and platelets.  
h. Transplanted cells come from the patient
LEUKEMIA

1. Leukemia is caused by the proliferation of _________________.

2. List five clinical manifestations of leukemia.
   a. ________________
   b. ________________
   c. ________________
   d. ________________
   e. ________________
   f. ________________

3. The diagnostic test that confirms a diagnosis of leukemia is _____________________.

4. The preferred treatment for leukemia is _____________________.

5. When is a child with acute lymphocytic leukemia considered to be in remission?

6. Why are allopurinol and intravenous fluids with sodium bicarbonate given before chemotherapy?

7. List two sanctuary sites.
   a. ________________
   b. ________________

8. Why are rectal temperatures contraindicated for the child with neutropenia?

9. A child is at severe risk of infection when his or her absolute neutrophil level is _____________________.

10. What should the nurse teach the child with leukemia and his or her family about oral hygiene?
11. What action is indicated if an immunosuppressed child is exposed to someone with chickenpox?

12. What precautions should be taken for a child who is thrombocytopenic?

**BRAIN TUMORS**

1. Manifestations of brain tumors vary with ________________ and ________________.

2. What are the two hallmark symptoms of brain tumors in children?
   a. ________________
   b. ________________

3. Currently, the imaging modality used to evaluate brain tumors is ________________.

4. Which treatment modalities are used to treat brain tumors in children younger than 3 years?

**OTHER CHILDHOOD CANCERS**

Answer as either true (T) or false (F).

1. _____ The abdominal mass on a child with Wilms’ tumor should be palpated every shift for changes.

2. _____ Treatment for tumor lysis syndrome includes allopurinol and hydration with IV fluids containing potassium.

3. _____ The primary treatment modality for non-Hodgkin’s lymphoma is surgery.

4. _____ Neuroblastoma is a solid tumor that is found in infants and children.

5. _____ In most cases, neuroblastoma manifests as a primary abdominal mass.

6. _____ Ewing’s sarcoma is the most common primary bone malignancy in children.

7. _____ Tumors in Ewing’s sarcoma are sensitive to radiation.

8. _____ Treatment of osteogenic sarcoma involves surgery and chemotherapy.

9. _____ Leukocoria and strabismus are common findings in most cases of retinoblastoma.
## Create Your Own Study Guide

Provide the description/pathophysiologic information for each condition or tumor listed in the following table.

<table>
<thead>
<tr>
<th>Description/Pathophysiology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilms’ tumor</td>
</tr>
<tr>
<td>Hodgkin’s disease</td>
</tr>
<tr>
<td>Non-Hodgkin’s lymphoma</td>
</tr>
<tr>
<td>Brain tumor</td>
</tr>
<tr>
<td>Neuroblastoma</td>
</tr>
<tr>
<td>Osteosarcoma</td>
</tr>
<tr>
<td>Ewing’s sarcoma</td>
</tr>
<tr>
<td>Rhabdomyosarcoma</td>
</tr>
<tr>
<td>Retinoblastoma</td>
</tr>
</tbody>
</table>
CREATE YOUR OWN STUDY GUIDE

Describe the clinical manifestations and treatment for each condition or tumor listed in the following table.

<table>
<thead>
<tr>
<th>Clinical Manifestations</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilms’ tumor</td>
<td></td>
</tr>
<tr>
<td>Hodgkin’s disease</td>
<td></td>
</tr>
<tr>
<td>Non-Hodgkin’s lymphoma</td>
<td></td>
</tr>
<tr>
<td>Brain tumor</td>
<td></td>
</tr>
<tr>
<td>Neuroblastoma</td>
<td></td>
</tr>
<tr>
<td>Osteosarcoma</td>
<td></td>
</tr>
<tr>
<td>Ewing’s sarcoma</td>
<td></td>
</tr>
<tr>
<td>Rhabdomyosarcoma</td>
<td></td>
</tr>
<tr>
<td>Retinoblastoma</td>
<td></td>
</tr>
</tbody>
</table>

SUGGESTED LEARNING ACTIVITIES

1. What are the guidelines for administration of chemotherapy at your clinical site?

2. If there is an oncology clinic at your clinical site, talk with the nurses about their responsibilities in the oncology clinic. Do the nurses need more advanced preparation in pediatric oncology?
The parents of a 12-year-old are concerned because he has had a low-grade fever for a week. His appetite and energy levels have decreased. They have also noticed bruises on his legs even though he has not been physically active. A complete blood count shows blast cells on the differential. The child is referred to a pediatric oncologist because leukemia is suspected. He is then admitted to the hospital. This is his first day in the hospital, and you are caring for him.

1. What diagnostic studies would you expect to be ordered for the child?

2. Respond to the following questions asked by his father: “What is a bone marrow biopsy? Why does my son need this test?”

When a bone marrow biopsy confirms acute lymphocytic leukemia (ALL), chemotherapy is initiated.

3. What are the nurse’s responsibilities when caring for a child receiving chemotherapy?

4. What nursing assessments will you make while the child is receiving chemotherapy?

When his parents leave the room to go to the cafeteria for lunch, the child asks you several questions. How would you respond when the child asks the following questions?

5. “Do I have to have a transplant?”

6. “Another boy in my class got leukemia last year and he died. Am I going to die too?”

7. “How long do I have to get chemo?”

8. “Will I lose my hair?”
REVIEW QUESTIONS

Choose the correct answer.

1. Bone marrow transplantation is considered standard therapy for which childhood cancer?
   a. Acute myelocytic leukemia
   b. Wilms’ tumor
   c. Osteosarcoma
   d. Hodgkin’s disease

2. The most common side effect of radiation therapy is
   a. vomiting.
   b. bone marrow suppression.
   c. fatigue.
   d. erythema at the radiation site.

3. Which position is contraindicated for a child following surgery to remove a brain tumor?
   a. Supine
   b. Prone
   c. Trendelenburg
   d. Low Fowler’s

4. When a child’s own bone marrow is used in a bone marrow transplant, it is called a(n)
   a. allogenic transplant.
   b. autologous transplant.
   c. homogenic transplant.
   d. none of these terms is correct.

5. A child with neutropenia following a round of chemotherapy is receiving a CSF. The purpose of the CSF is to stimulate the production of
   a. blast cells.
   b. platelets.
   c. red blood cells.
   d. white blood cells.

6. A child has a history of a fever of unknown origin, excessive bruising, and fatigue. This combination of symptoms is suggestive of which childhood cancer?
   a. Leukemia
   b. Neuroblastoma
   c. Lymphoma
   d. Osteosarcoma

7. A diagnosis of leukemia is confirmed by which of the following studies?
   a. Lumbar puncture
   b. Bone scan
   c. Bone marrow biopsy
   d. Complete blood count

8. Which of the following instructions would the nurse give to a 15-year-old with a platelet count of 18,000?
   a. Eat a low-bacteria diet
   b. Use a soft-bristled toothbrush
   c. Get extra rest
   d. Make sure you take an iron supplement

9. Which of the following would be the best fluid choice for the child who is nauseated from chemotherapy?
   a. Child’s favorite-flavored milkshake
   b. Room temperature water
   c. Sips of cold soda
   d. Hot tea with honey

10. What would the nurse tell an adolescent receiving chemotherapy about alopecia?
    a. “Don’t worry. Most chemotherapy does not cause hair loss.”
    b. “Your hair will grow back but it might be a different color or texture.”
    c. “Your hair will come back when you are finished with all of your chemotherapy.”
    d. “Aren’t you lucky. The bald look is in right now.”

11. Which of the following would not be included in a plan of care for a child with Wilms’ tumor?
    a. Palpate the abdominal mass for any changes.
    b. Teach the child and family about a nephrectomy.
    c. Talk with the family about postoperative chemotherapy.
    d. Assess the urine for microscopic or gross hematuria.

12. The prevention of tumor lysis syndrome would include which of the following?
    a. Hydration and alkalinizing the urine
    b. Administering bicarbonate to make the urine acidic
    c. Assessing urine for hematuria
    d. Administering leucovorin rescue
13. What is the risk for infection if a child’s absolute neutrophil count is less than 400 cells/mm³?
   a. Severe
   b. Moderate
   c. Minimal
   d. Not significant

14. Which of the following is considered a hallmark symptom of brain tumor in children?
   a. Ataxia
   b. Morning vomiting
   c. Visual changes
   d. Seizure