

## Lesson 5 Reading Material: Treatment and Prevention of Cancer

### "Treating Cancer: What can be done?"

The number of treatment choices a patient has, depends on the type of cancer, the stage of the cancer, and other individual factors such as age, health status, and personal preferences. Different types of cancer can behave very differently. For example, lung cancer and breast cancer are very different diseases. They grow at different rates and respond to different treatments. Each cancer type is associated with a different prognosis (predicted outcome). That is why people with cancer

need treatment that is aimed at their particular kind of cancer.



### **Diagnosis: identifying the nature and cause of a disease**

-After examining a patient, the doctor will diagnose him/her with a particular disease depending on the symptoms

### **Prognosis: 1) A prediction of the outcome of a disease**

### **2) The likelihood of recovery from a disease**

-After classifying the patient's cancer type, its stage, and its progression so far, a doctor can determine a prognosis. A person with late stage cancer that has metastasized is said to have a poor prognosis, because the outcome of the disease is likely to be bad.

## Classification of Cancer: Staging and TNM

A person's cancer treatment will be entirely based on their unique situation. Certain types of cancer respond very differently to different types of treatment, so determining the type of cancer is a vital step toward knowing which treatments will be most effective. The cancer's stage (how widespread it is) will also determine the best course of treatment, since early-stage cancers respond to different therapies than later-stage ones.

Once a diagnosis of cancer is made, it is important that the stage of disease be assessed. Staging means performing exams and tests to learn the extent of the cancer within the body, especially whether the disease has spread from the original site to other parts of the body. It is important to know the stage of the disease in order to plan the best treatment. **Stage** generally refers to the degree to which the cancer has spread beyond its original location. Lower stages of cancer (stages I and II) are generally more confined to their site or region of origin than more advanced stages (III or IV).

Different cancer types are staged in different ways, according to a complex series of rules. While there are subtle differences in the staging rules for different cancer types, a physician generally needs to look at three things:

**"T" stage (tumor stage)**, defined according to the size of the tumor itself;

**"N" stage (nodal stage)**, defined according to the number of lymph nodes which contain cancer; and

**"M" stage (stage of metastatic disease)**, defined according to the presence (or absence) of cancer that has spread into other organs or parts of the body.

The T, N, and M stages have many nuances within them, and each is subdivided (T1, T2, T3, etc.) Different combinations of T, N, and M combine under the staging rules to determine whether a patient is stage I, II, III, or IV. In some cancers, there are even additional stages to account for unique situations (Stage V, for instance). It should also be noted that some cancers are staged with different staging systems, but the TNM system is the most common.

Ultimately, the goal of staging is threefold:

1. To help select the most appropriate therapy for the patient;
2. To help predict a patient's prognosis; and
3. To help future patients by assessing your response to therapy and tracking that along with the treatment responses of others with the same stage of cancer. This is necessary so that physicians can determine which treatments work best for which patients, so that less effective treatments can be discarded.

A patient's cancer stage is evaluated in a variety of ways. These include taking a thorough history of the patient's disease, doing a careful physical examination, and obtaining laboratory and radiographic studies (various blood tests, a chest x-ray, and abdominal CT scan, etc.) In some cases, surgical exploration is required to fully stage a patient's disease. In other cases, surgeons need to extract only a small sample of the cancerous tissue (a **biopsy**), which is generally a relatively minor procedure.

When a patient presents with cancer that has a higher stage number, their prognosis is poorer. An example below shows that patients with higher stages of non-small cell lung cancer, had a much smaller survival rate.

#### *Non-small Cell Lung Cancer Survival by Stage Based On Clinical Studies*

Stage	5 - year Relative Survival Rate
I	47%
II	26%
III	8%
IV	2%

The 5-year survival rate refers to the percentage of patients who live at least 5 years after their cancer is diagnosed. Many patients live much longer than 5 years after diagnosis, and 5-year rates are used to produce a standard way of discussing prognosis.

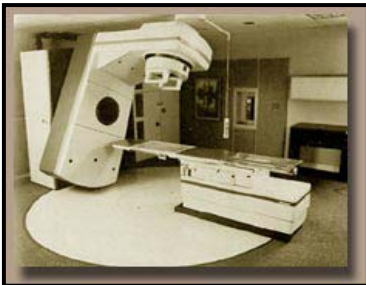
#### **MAJOR TREATMENT OPTIONS FOR CANCER**

The four major types of treatment for cancer are surgery, radiation, chemotherapy, and biologic therapies. You might also have heard about hormone therapies such as tamoxifen and transplant options such as those done with bone marrow.

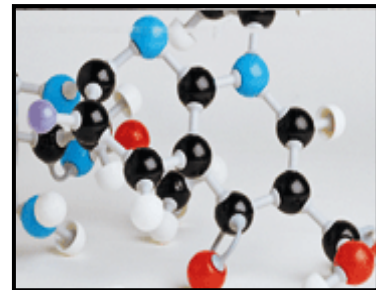
### Chemotherapy



### Surgery



### Radiation therapy



### Biological response modifiers

## **SURGERY**

Surgery is the oldest form of treatment for cancer. It also has an important role in diagnosing and staging (finding the extent) of cancer. Advances in surgical techniques have allowed surgeons to successfully operate on a growing number of patients. Today, more limited (less invasive) operations are often done to remove tumors while preserving as much normal function as possible. Surgery offers the greatest chance for cure for many types of cancer, especially those that have not yet spread to other parts of the body. Most people with cancer will have some type of surgery.

Surgery can be done for Preventive or Prophylactic, Diagnostic, Staging, Curative, Debulking or cytoreductive, Palliative, Supportive, Restorative.

## **RADIATION THERAPY**

Radiation is energy that is carried by waves or a stream of particles that can alter the genetic code (DNA) and a variety of molecules of a cell. This genetic code controls how cells in the body grow and divide.

Goal: To concentrate radiation dose to target tumor tissues and minimize damage to normal tissues

Types:

Brachytherapy: Radiation sources placed directly into tumor volume

Teletherapy - Therapy at a large distance outside body

## CHEMOTHERAPY

Chemo-: Chemical

-therapy: treatment

Therefore chemotherapy means treatment with chemicals or drugs.

While surgery and radiation therapy are used to treat localized cancers, chemotherapy is used to treat cancer cells that have metastasized (spread) to other parts of the body. Depending on the type of cancer and its stage of development, chemotherapy can be used to cure cancer, to keep the cancer from spreading, to slow the cancer's growth, to kill cancer cells that may have spread to other parts of the body, or to relieve symptoms caused by cancer. Chemotherapy is treatment with powerful medicines that are most often given by mouth or by injection. Unlike radiation therapy or surgery, chemotherapy drugs can treat cancers that have spread throughout the body, because they travel throughout the body in the bloodstream. Often, a combination of chemotherapy is used instead of a single drug. Chemotherapy is given in cycles, each followed by a recovery period. The total course of chemotherapy is often about six months, usually ranging from three to nine months. After a cancer is removed by surgery, chemotherapy can significantly reduce the risk of cancer returning. The chances of cancer returning and the potential benefit of chemotherapy depend on the type of cancer and other individual factors.

Chemotherapeutic agents are often designed based on their ability to target and kill rapidly growing cells (ie cancer cells). Therefore, cancer cells, because they are dividing so often, will be more sensitive to chemotherapeutic agents. The other cells in the body that grow rapidly are hair follicles and cells in the GI tract. This is why chemotherapy can cause hair loss and some gastrointestinal discomfort.

## **BIOLOGIC THERAPIES**

There is a lot of evidence that suggests that the immune system, the body's natural defense mechanism, plays a major role in the body's response to cancer. At least some forms of cancer occur when the immune system fails to destroy cancer cells or to prevent their growth. Biologic therapy is an effective treatment for certain cancers. It is sometimes called immunotherapy, biotherapy, or biological response modifier therapy. Biologic therapies use the body's immune system to fight cancer or to lessen the side effects of some cancer treatments. Biologic therapies can act in several ways in cancer treatment. These include interfering with cancer cell growth, acting indirectly to help healthy immune cells control cancer, and helping to repair normal cells damaged by other forms of cancer treatment.

## **COMPLEMENTARY AND ALTERNATIVE THERAPIES**

Complementary and alternative therapies are a diverse group of health care practices, systems, and products that are not part of usual medical treatment. They may include products such as vitamins, herbs, or dietary supplements, or procedures such as acupuncture, massage, and a host of other types of treatment. There is a great deal of interest today in complementary and alternative treatments for cancer. Many are now being studied to find out if they are truly helpful to people with cancer.

## **PREVENTION AND EARLY DETECTION OF CANCER**

### **Signs and Symptoms:**

**Symptom:** **What you feel or notice.** A symptom is an indication of disease, illness, injury, or that something is not right in the body. Symptoms are felt or noticed by a person, but may not easily be noticed by anyone else.

## Sign: What the doctor finds

A sign is also an indication that something is not right in the body. But signs are defined as observations made by a doctor, nurse, or other health care professional.



Cancer is a group of diseases that may cause any sign or symptom. The signs and symptoms will depend on the size of the cancer, where the cancer is, and how much it affects the surrounding organs or structures. If a cancer spreads (metastasizes), then symptoms may appear in different parts of the body.

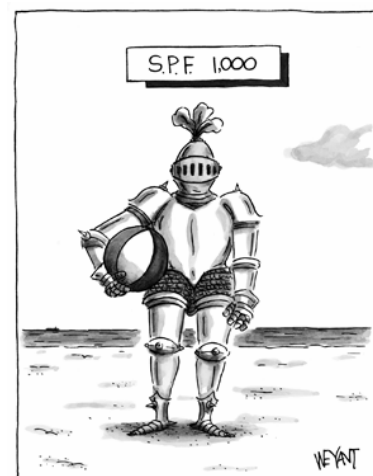
## How Are Signs and Symptoms Helpful?

Treatment is most successful when the cancer is found as early as possible. Finding cancer early usually means it can be treated while it is still small and is less likely to have spread to other parts of the body. Usually, this means a better chance for a cure, especially if initial treatment is to be surgery.

A good example of the importance of detecting cancer early is melanoma skin cancer. It is easily removed if has not yet grown deeply into the skin, and the 5-year survival rate (percentage of people living at least 5 years after diagnosis) at this stage is nearly 100%. But once melanoma has spread to other parts of the body, the survival rate drops dramatically.

## Can cancer be prevented?

Smoking and drinking alcohol cause some people to get certain types of cancer. These cancers might be prevented by avoiding tobacco and alcohol. The best idea is to never use tobacco at all. Cigarettes, cigars, pipes and smokeless tobacco cause cancer and should not be used. People who already smoke should try to quit. Former smokers have less risk of cancer than do



people who continue to smoke. The chances of getting skin cancer can be lowered by staying in the shade as much as you can, wearing a hat and shirt when you are in the sun, and using sunscreen. We know that our diet, (what we eat) is linked to some types of cancer, although the exact reasons are not yet clear. The best advice is to eat a lot of fresh fruits and vegetables and whole grains like pasta and bread, and to cut down on high fat foods. There are tests, called screening examinations, that adults should have in order to find cancer early. If cancer is found early it can often be cured.





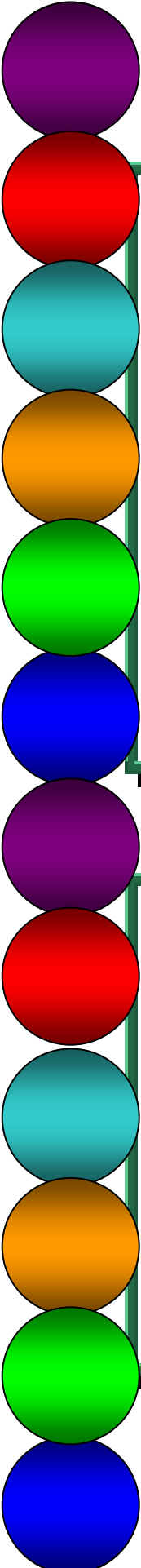
## Lesson 5 Problem Set: Treatment and Prevention of Cancer

**Short Answer:** Please answer the following questions.

1. How do good detection methods of cancer help cure it?
2. What is the difference between diagnosis and prognosis?
3. Besides being used as a treatment, surgery also has other useful properties. What else might surgery be used for in cancer patients?
4. What is radiation?
5. Can cancer be prevented? How?

**True/False:** Determine whether the following statements are true or false. If you choose False, please explain why the part or all of the statement is incorrect.

1. Finding most cancers early make the disease more manageable and easy to cure. Melanoma, cancer of the skin, is one exception to this rule. It does not matter whether you find it early or later on, the outcome will be the same.
2. There is a cure for cancer. Explain your answer.
3. Staging a disease is important before determining how to treat it.
4. Tumors are staged according to the TNM staging rules. T stands for tumor size, N stands for nerve damage and M stands for extent of metastasis.



5. The five-year survival rate is 2% for a patient that has Stage IV non-small cell lung cancer.

6. Radiation is a laser that can alter DNA.

7. The goal of any cancer treatment is to spare the host tissue and do minimal damage to the normal tissue and the maximum damage to the cancer tissue.

8. Chemotherapeutic agents can cause hair loss because they generally target rapidly growing cells, and cells in the hair follicle grow rapidly.

Vocabulary:

1. Teletherapy:

2. Brachytherapy:

3. Chemotherapy:

4. Biologic Therapy:

5. Symptom:

6. Sign:

**Lesson 5 Problem Set: Treatment and Prevention of Cancer**  
**Teacher's Answers**

**Short Answer:**

1. How do good detection methods of cancer help cure it?

*A: Good methods of detection can help us to identify cancer at early stages, where it is generally easier to cure.*

2. What is the difference between diagnosis and prognosis?

*A: A diagnosis is when a doctor identifies the nature and cause of a disease, where as the prognosis is the prediction of the outcome of the disease and the likelihood of recovery.*

3. Besides being used as a treatment, surgery also has other useful properties. What else might surgery be used for in cancer patients?

*A: Surgery is important for diagnosing and determining the extent of the disease as well. A number studies can be done on a tumor that has been removed from a patient that can give the doctor an idea of what caused the cancer and what the prognosis of a patient might be. Surgery can also be used as a preventative method. Polyps, benign tumors of the colon, can be removed early, to prevent the onset of a malignant cancer phenotype.*

4. What is radiation?

*A: Radiation is energy that is carried by waves or a stream of particles that can alter the genetic code (DNA) and a variety of molecules of a cell.*

5. Can cancer be prevented? How?

*A: Cancer can be prevented by not smoking, drinking excessive alcohol or spending too much time in the sun without sunscreen.*

True/False:

1. Finding most cancers early make the disease more manageable and easy to cure. Melanoma, cancer of the skin, is one exception to this rule. It does not matter whether you find it early or later on, the outcome will be the same.

A: False: Melanoma is a prime example of curing people because of early detection. If melanoma is found before it infiltrates deep into the skin, the 5-year survival rate is nearly 100%. If it is found in later stages, it can be very fatal.

2. There is a cure for cancer. Explain your answer.

A: This question is a tricky one. If the student says False, they should write that cancer is made up of more than 100 different types of diseases and that each one can arise in different ways and a person's treatment is dependent on their unique situation. If they happen to say True, they should explain for certain diseases there has been a significant success rate with certain drugs that could be considered a "cure". One such example is the use of a drug called Gleevec for Leukemia. The concept they should understand is that there is unlikely going to be one single cure for cancer, since all cancers occur differently and have different characteristics.

3. Staging a disease is important before determining how to treat it.

A: True

4. Tumors are staged according to the TNM staging rules. T stands for tumor size, N stands for nerve damage and M stands for extent of metastasis.

A: False: N stands for nodal involvement, which is defined as the number of lymph nodes that contain the cancer.

5. The five-year survival rate is 2% for a patient that has Stage IV non-small cell lung cancer.

A: True

6. Radiation is a laser that can alter DNA.

**A: False: Radiation is energy that is carried by waves or a stream of particles that can alter the genetic code (DNA) and a variety of molecules of a cell.**

7. The goal of any cancer treatment is to spare the host tissue and do minimal damage to the normal tissue and the maximum damage to the cancer tissue.

**A: True**

8. Chemotherapeutic agents can cause hair loss because they generally target rapidly growing cells, and cells in the hair follicle grow rapidly.

**A: True**

**Vocabulary:**

1. Teletherapy:

**A: Radiation therapy at a large distance outside body**

2. Brachytherapy:

**A: Radiation sources placed directly into tumor volume**

3. Chemotherapy:

**A: Treatment of cancers with chemicals or drugs**

4. Biologic Therapy:

**A: Biologic therapies use the body's immune system to fight cancer or to lessen the side effects of some cancer treatments.**

## 5. Symptom:

A: What you feel. A symptom is an indication of disease, illness, injury, or that something is not right in the body. Symptoms are felt or noticed by a person, but may not easily be noticed by anyone else.

## 6. Sign:

A: What the doctor finds. A sign is also an indication that something is not right in the body. But signs are defined as observations made by a doctor, nurse, or other health care professional.