

# Cancer Overview

By Alice Lesch Kelly

*This is the introduction to a learning module commissioned by a company that designs training programs and other custom learning solutions for healthcare professionals and their employees.*

CANCER IS THE SECOND LEADING CAUSE OF DEATH in the United States. Although there are more than 100 kinds of cancer, each with its own unique growth pattern, symptoms, and treatment approaches, most cancers share certain characteristics.

The following summary answers some commonly asked questions about cancer.

## **What is cancer?**

Cancer is a disease that develops when genetic damage interferes with cell function and allows cells to grow abnormally.

## **How do cancer cells differ from normal cells?**

Cancer cells show certain aberrations—for example, they vary in size, shape, proportion, and appearance compared to normal cells. They also exhibit atypical growth, metabolism, and reproduction. They have a high rate of mutation and are able to spread to local and distant tissue.

**What is a carcinogen?**

A carcinogen is anything that can cause cancer. Carcinogens can trigger genetic mutations that may lead to abnormal cell growth. Common carcinogens include cigarette smoke, industrial chemicals, pesticides, estrogen, ultraviolet light, and the human papillomavirus virus.

Carcinogenesis refers to the multistep process by which cancer develops from mutated cells.

**How do genetic abnormalities contribute to the development of cancer?**

During normal cell division, DNA is synthesized, chromosomes are duplicated, and new cells are formed. A cell's function is determined by the activation or suppression of genes. When genes undergo abnormal changes due to mutation, deletion, or amplification, cell function can be altered, and cancer can develop. People can inherit flawed DNA, but most DNA damage is caused by environmental carcinogens.

Three types of genes appear to play a part in triggering cancer:

- **Oncogenes** promote normal cell growth. When oncogenes mutate, they can trigger excessive cell multiplication that can cause cancer.
- **Tumor-suppressor genes** typically control cell growth; mutations in tumor-suppressor genes can allow uncontrolled cell growth.
- **DNA-repair genes** oversee the copying of genetic information during cell division. Mutations in these genes can result in chromosomal abnormalities that can lead to cancer.

**What is a tumor?**

A tumor is an abnormal growth of cells. Tumors are described as being benign (noncancerous) or malignant (cancerous).

There are two main kinds of tumors:

- **Solid tumors** are a mass of abnormal cells embedded in tissue. The most common kind of solid tumors, carcinomas, account for 80% of human cancers. Other types of solid tumors are sarcomas, adenocarcinomas, and blastomas. Solid tumors tend to cause symptoms related to the affected organ—for example, patients with lung cancer are likely to present with a cough.

- **Hematologic malignancies**, which are not solid, can develop within cells of the blood and the lymphatic system. These cancers typically present as systemic disease, causing body-wide symptoms such as fatigue, anemia, bleeding, or infection.

### **How do tumors grow?**

As cancer cells divide, a tumor increases in size. During a process called angiogenesis, abnormal blood vessels develop to provide the tumor with an ample blood supply. Although various types of cancer cells grow at different rates, it typically takes about five years for a tumor to become large enough to be clinically detectable. A tumor's growth speed can impact prognosis, treatment, and treatment response.

Tumor progression can also be fueled by hormones. Cancers that develop from tissues containing receptors for steroid sex hormones such as estrogen, progesterone, and testosterone may grow in response to stimulation from these hormones.

### **What is metastasis?**

Metastasis refers to the spread of cancer beyond its site of origin. Cancer becomes most dangerous when abnormal cells spread (metastasize) via lymphatic vessels or blood vessels to local, regional, or distant tissue. If spreading cells are not destroyed by the immune system or clinical treatment, they can establish themselves and form tumors in new sites, such as organs, and eventually cause organ failure and death. Certain kinds of tumors metastasize to specific organs. For example, breast cancer typically metastasizes to the lungs, liver, bones, brain, and adrenal glands.

### **What are the most common kinds of cancer?**

- The most common cancer sites are the skin, prostate, breast, lung/bronchus, colon/rectum, blood, bladder, and uterus.
- The most common causes of cancer death are cancer of the lung, colon/rectum, breast, blood, prostate, pancreas, and ovary.

**Can cancer risk be reduced?**

Research has uncovered a range of environmental factors and lifestyle choices that play a significant part in cancer risk. For example, tobacco use is responsible for one-third of all cancers in the United States each year. Other factors associated with increased cancer risk include a high-fat diet, obesity, excessive sun exposure, heavy alcohol use, radiation, environmental chemicals, and the use of hormone therapy.

Lifestyle and environmental changes can lower the chances of developing some kinds of cancer. For example, cutting out tobacco use can have a profound impact on lung cancer risk, because tobacco is responsible for 85% of lung cancer deaths.

Although cancer kills one in four Americans, cancer death rates have been decreasing in recent years. For example, the death rate for colorectal cancer fell 24% between 1973 and 1995. Mortality rates have also gone down for lung cancer in men, as well as breast, prostate, and testicular cancer, Hodgkin's disease, and cancers in children.