What's the worst thing you can do to hurt your health?

Besides pathogens, many other dangers in the environment may negatively affect human health. For example, air pollution can cause lung cancer. It can also make asthma and other diseases worse. Bioterrorism is another potential threat in the environment. It may poison large numbers of people or cause epidemics of deadly diseases. But the worst thing you can do to yourself is smoke cigarettes.
Carcinogens and Cancer

A **carcinogen** is anything that can cause cancer. **Cancer** is a disease in which cells divide out of control. Most carcinogens cause cancer by producing mutations in DNA.

Types of Carcinogens

There are several different types of carcinogens. They include pathogens, radiation, and chemicals. Some carcinogens occur naturally. Others are produced by human actions.

- Viruses cause about 15 percent of all human cancers. For example, the virus called hepatitis B causes liver cancer.
- UV radiation is the leading cause of skin cancer. The radioactive gas known as radon causes lung cancer.
- Tobacco smoke contains dozens of carcinogens, including nicotine and formaldehyde. Exposure to tobacco smoke is the leading cause of lung cancer.
- Some chemicals that were previously added to foods, such as certain dyes, are now known to cause cancer. Cooking foods at very high temperatures also causes carcinogens to form (see **Figure** below).

![](https://bio.libretexts.org/Bookshelves/Introductory_and_General_Biology/Book%3A_Introductory_Biology_(CK-12)/13%3A_H...)

Barbecued foods are cooked at very high temperatures. This may cause carcinogens to form.

How Cancer Occurs

Mutations that lead to cancer usually occur in genes that control the cell cycle. These include tumor-suppressor genes and proto-oncogenes.

- **Tumor-suppressor genes** normally prevent cells with damaged DNA from dividing. Mutations in these genes prevent them from functioning normally. As a result, cells with damaged DNA are allowed to divide.
- **Proto-oncogenes** normally help control cell division. Mutations in these genes turn them into oncogenes. **Oncogenes** promote the division of cells with damaged DNA.

Cells that divide uncontrollably may form a **tumor**, or abnormal mass of cells. Tumors may be benign or malignant. **Benign tumors** remain localized and generally do not harm health. **Malignant tumors** are cancerous. There are no limits to their growth, so they can invade and damage neighboring tissues. Cells from malignant tumors may also break away from the tumor and enter the bloodstream. They are carried to other parts of the body, where new tumors may form. The most common and the most deadly cancers for U.S. adults are listed in **Table** below.
<table>
<thead>
<tr>
<th>Gender</th>
<th>Most Common Types of Cancer after Skin Cancer (% of all cancers)</th>
<th>Most Common Causes of Cancer Deaths (% of all cancer deaths)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>prostate cancer (33%), lung cancer (13%)</td>
<td>lung cancer (31%), prostate cancer (10%)</td>
</tr>
<tr>
<td>Females</td>
<td>breast cancer (32%), lung cancer (12%)</td>
<td>lung cancer (27%), breast cancer (15%)</td>
</tr>
</tbody>
</table>

More cancer deaths in adult males and females are due to lung cancer than any other type of cancer. Lung cancer is most often caused by exposure to tobacco smoke. What might explain why lung cancer causes the most cancer deaths when it isn't the most common type of cancer?

Cancer Treatment and Prevention

Most cancers can be treated, and some can be cured. The general goal of treatment is to remove the tumor without damaging other cells. A cancer patient is typically treated in more than one way. Possible treatments include surgery, drugs (chemotherapy), and radiation. Early diagnosis and treatment of cancer lead to the best chance for survival. That's why it's important to know the following warning signs of cancer:

- change in bowel or bladder habits
- sore that does not heal
- unusual bleeding or discharge
- lump in the breast or elsewhere
- chronic indigestion or difficulty swallowing
- obvious changes in a wart or mole
- persistent coughing or hoarseness

Having one or more warning signs does not mean you have cancer, but you should see a doctor to be sure. Getting routine tests for particular cancers can also help detect cancers early, when chances of a cure are greatest. For example, getting the skin checked regularly by a dermatologist is important for early detection of skin cancer (see Figure below).
Regular checkups with a dermatologist can detect skin cancers early. Why is early detection important?

You can take steps to reduce your own risk of cancer. For example, you can avoid exposure to carcinogens such as tobacco smoke and UV light. You can also follow a healthy lifestyle. Being active, eating a low-fat diet, and maintaining a normal weight can help reduce your risk of cancer.

Summary

- A carcinogen is anything that causes cancer.
- Most carcinogens produce mutations in genes that control the cell cycle.

Review

1. What is a carcinogen? What is cancer?
2. How do most carcinogens cause cancer? Give two examples of carcinogens.
3. Describe tumor-suppressor genes and describe how they cause cancer.
4. Identify three ways cancer can be treated.
5. List four warning signs of cancer.
6. What might explain why lung cancer causes the most cancer deaths when it isn’t the most common type of cancer?