Metastatic Cancer

Key Points

- Metastatic cancer is cancer that has spread from the place where it first started to another place in the body.
- Metastatic cancer has the same name and same type of cancer cells as the original cancer.
- The most common sites of cancer metastasis are, in alphabetical order, the bone, liver, and lung.

1. What is metastatic cancer?

Metastatic cancer is cancer that has spread from the place where it first started to another place in the body. A tumor formed by metastatic cancer cells is called a metastatic tumor or a metastasis. The process by which cancer cells spread to other parts of the body is also called metastasis.

Metastatic cancer has the same name and the same type of cancer cells as the original, or primary, cancer. For example, breast cancer that spreads to the lung and forms a metastatic tumor is metastatic breast cancer, not lung cancer.

Under a microscope, metastatic cancer cells generally look the same as cells of the original cancer. Moreover, metastatic cancer cells and cells of the original cancer usually have some molecular features in common, such as the expression of certain proteins or the presence of specific chromosome changes.

Although some types of metastatic cancer can be cured with current treatments, most cannot. Nevertheless, treatments are available for all patients with metastatic cancer. In general, the primary goal of these treatments is to control the growth of the cancer or to relieve symptoms caused by it. In some cases, metastatic cancer treatments may help prolong life. However, most people who die of cancer die of metastatic disease.

2. Can any type of cancer form a metastatic tumor?

Virtually all cancers, including cancers of the blood and the lymphatic system (leukemia, multiple myeloma, and lymphoma), can form metastatic tumors. Although rare, the metastasis of blood and lymphatic system cancers to the lung, heart, central nervous system, and other tissues has been reported.

3. Where does cancer spread?

The most common sites of cancer metastasis are, in alphabetical order, the bone, liver, and lung. Although most cancers have the ability to spread to many different parts of the body, they usually spread to one site more often than others. The following table shows the most common sites of
metastasis, excluding the lymph nodes, for several types of cancer:

<table>
<thead>
<tr>
<th>Cancer type</th>
<th>Main sites of metastasis*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bladder</td>
<td>Bone, liver, lung</td>
</tr>
<tr>
<td>Breast</td>
<td>Bone, brain, liver, lung</td>
</tr>
<tr>
<td>Colorectal</td>
<td>Liver, lung, peritoneum</td>
</tr>
<tr>
<td>Kidney</td>
<td>Adrenal gland, bone, brain, liver, lung</td>
</tr>
<tr>
<td>Lung</td>
<td>Adrenal gland, bone, brain, liver, other lung</td>
</tr>
<tr>
<td>Melanoma</td>
<td>Bone, brain, liver, lung, skin/muscle</td>
</tr>
<tr>
<td>Ovary</td>
<td>Liver, lung, peritoneum</td>
</tr>
<tr>
<td>Pancreas</td>
<td>Liver, lung, peritoneum</td>
</tr>
<tr>
<td>Prostate</td>
<td>Adrenal gland, bone, liver, lung</td>
</tr>
<tr>
<td>Stomach</td>
<td>Liver, lung, peritoneum</td>
</tr>
<tr>
<td>Thyroid</td>
<td>Bone, liver, lung</td>
</tr>
<tr>
<td>Uterus</td>
<td>Bone, liver, lung, peritoneum, vagina</td>
</tr>
</tbody>
</table>

*In alphabetical order. Brain includes the neural tissue of the brain (parenchyma) and the leptomeninges (the two innermost membranes—arachnoid mater and pia mater—of the three membranes known as the meninges that surround the brain and spinal cord; the space between the
arachnoid mater and the pia mater contains cerebrospinal fluid). Lung includes the main part of the lung (parenchyma) as well as the pleura (the membrane that covers the lungs and lines the chest cavity).

4. **How does cancer spread?**

Cancer cell metastasis usually involves the following steps:

- **Local invasion**: Cancer cells invade nearby normal tissue.
- **Intravasation**: Cancer cells invade and move through the walls of nearby lymph vessels or blood vessels.
- **Circulation**: Cancer cells move through the lymphatic system and the bloodstream to other parts of the body.
- **Arrest and extravasation**: Cancer cells arrest, or stop moving, in small blood vessels called capillaries at a distant location. They then invade the walls of the capillaries and migrate into the surrounding tissue (extravasation).
- **Proliferation**: Cancer cells multiply at the distant location to form small tumors known as micrometastases.
- **Angiogenesis**: Micrometastases stimulate the growth of new blood vessels to obtain a blood supply. A blood supply is needed to obtain the oxygen and nutrients necessary for continued tumor growth.

Because cancers of the lymphatic system or the blood system are already present inside lymph vessels, lymph nodes, or blood vessels, not all of these steps are needed for their metastasis. Also, the lymphatic system drains into the blood system at two locations in the neck.

The ability of a cancer cell to metastasize successfully depends on its individual properties; the properties of the noncancerous cells, including immune system cells, present at the original location; and the properties of the cells it encounters in the lymphatic system or the bloodstream and at the final destination in another part of the body. Not all cancer cells, by themselves, have the ability to metastasize. In addition, the noncancerous cells at the original location may be able to block cancer cell metastasis. Furthermore, successfully reaching another location in the body does not guarantee that a metastatic tumor will form. Metastatic cancer cells can lie dormant (not grow) at a distant site for many years before they begin to grow again, if at all.

5. **Does metastatic cancer have symptoms?**

Some people with metastatic tumors do not have symptoms. Their metastases are found by x-rays or other tests.

When symptoms of metastatic cancer occur, the type and frequency of the symptoms will depend on the size and location of the metastasis. For example, cancer that spreads to the bone is likely to cause
pain and can lead to bone fractures. Cancer that spreads to the brain can cause a variety of symptoms, including headaches, seizures, and unsteadiness. Shortness of breath may be a sign of lung metastasis. Abdominal swelling or jaundice (yellowing of the skin) can indicate that cancer has spread to the liver.

Sometimes a person’s original cancer is discovered only after a metastatic tumor causes symptoms. For example, a man whose prostate cancer has spread to the bones in his pelvis may have lower back pain (caused by the cancer in his bones) before he experiences any symptoms from the original tumor in his prostate.

6. Can someone have a metastatic tumor without having a primary cancer?

No. A metastatic tumor is always caused by cancer cells from another part of the body.

In most cases, when a metastatic tumor is found first, the primary cancer can also be found. The search for the primary cancer may involve lab tests, x-rays, computed tomography (CT) scans, magnetic resonance imaging (MRI) scans, positron emission tomography (PET) scans, and other procedures.

However, in some patients, a metastatic tumor is diagnosed but the primary tumor cannot be found, despite extensive tests, because it either is too small or has completely regressed. The pathologist knows that the diagnosed tumor is a metastasis because the cells do not look like those of the organ or tissue in which the tumor was found. Doctors refer to the primary cancer as unknown or occult (hidden), and the patient is said to have cancer of unknown primary origin (CUP).

Because diagnostic techniques are constantly improving, the number of cases of CUP is going down. More information can be found in the Carcinoma of Unknown Primary Treatment (PDQ®) summary, which is part of NCI’s comprehensive cancer information database.

7. If a person who was previously treated for cancer gets diagnosed with cancer a second time, is the new cancer a new primary cancer or metastatic cancer?

The cancer may be a new primary cancer, but, in most cases, it is metastatic cancer.

8. What treatments are used for metastatic cancer?

Metastatic cancer may be treated with systemic therapy (chemotherapy, biological therapy, targeted therapy, hormonal therapy), local therapy (surgery, radiation therapy), or a combination of these treatments. The choice of treatment generally depends on the type of primary cancer; the size, location, and number of metastatic tumors; the patient’s age and general health; and the types of treatment the patient has had in the past. In patients with CUP, it is possible to treat the disease even though the primary cancer has not been found.
9. Are new treatments for metastatic cancer being developed?

Yes, researchers are studying new ways to kill or stop the growth of primary cancer cells and metastatic cancer cells, including new ways to boost the strength of immune responses against tumors. In addition, researchers are trying to find ways to disrupt individual steps in the metastatic process.

Before any new treatment can be made widely available to patients, it must be studied in clinical trials (research studies) and found to be safe and effective in treating disease. NCI and many other organizations sponsor clinical trials that take place at hospitals, universities, medical schools, and cancer centers around the country. Clinical trials are a critical step in improving cancer care. The results of previous clinical trials have led to progress not only in the treatment of cancer but also in the detection, diagnosis, and prevention of the disease. Patients interested in taking part in a clinical trial should talk with their doctor.

Selected References


